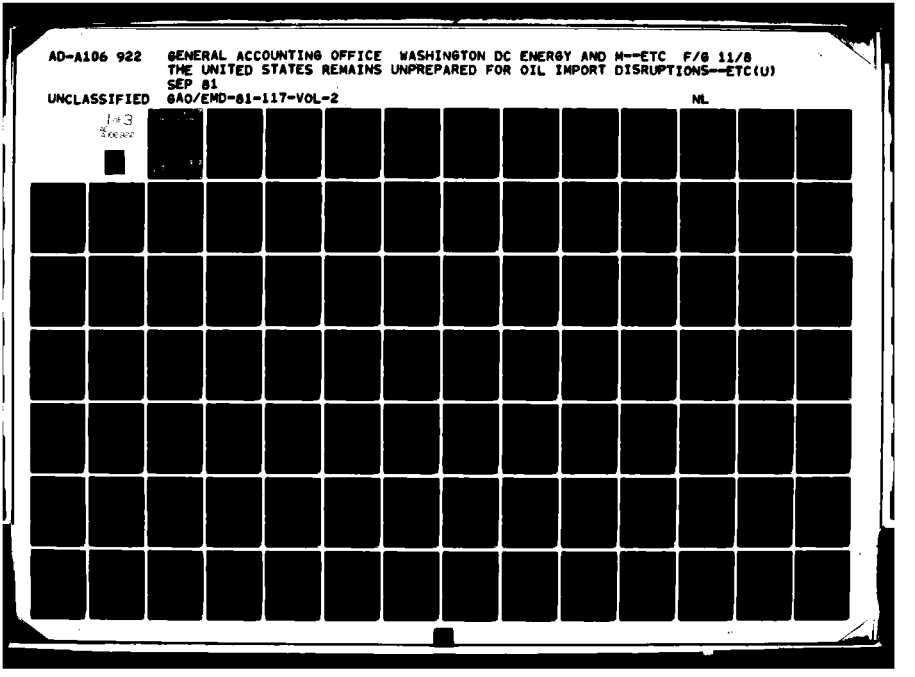
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THE UNITED STATES REMAINS UNPREPARED FOR OIL IMPORT DISRUPTIONS--ETC(U)
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LEVEL II

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

The United States Remains Unprepared For Oil Import Disruptions

Volume I of 2 Volumes

Detailed review of current emergency programs and alternative approaches

The U.S. Government is almost totally unprepared to deal with disruptions in oil imports. Oil import disruptions such as the 1973 oil embargo and the 1979 Iranian shortfall pose a significant threat to national security, and the lack of effective contingency planning and program development to date is serious and requires immediate attention.

The Government must make a determined commitment to emergency preparedness now, while oil markets are slack, to prepare for any future disruption. GAO's report contains numerous recommendations which will facilitate effective planning.

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VOLUME II

TECHNICAL REPORT

ABBREVIATIONS

AGA	American Gas Association
ANS	Alaska North Slope
API	American Petroleum Institute
BPFC	Base Period Final Consumption
CBO	Congressional Budget Office
CIA	Central Intelligence Agency
CPI	Consumer Price Index
DAS	Deputy Assistant Secretary
DCO	Delayed Compliance Order
DOE	Department of Energy
DR	Demand Restraint
EBTR	Emergency Building Temperature Restrictions
EECA	Emergency Energy Conservation Act
EMD	Energy and Minerals Division (of GAO)
EP	Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness
EPA	Environmental Protection Agency
EPAA	Emergency Petroleum Allocation Act
EPCA	Emergency Policy and Conservation Act
ERA	Economic Regulatory Administration
ERDO	Emergency Reserve Drawdown Obligation
ESS	Emergency Sharing System
ESSD	Emergency Strategies and Scenario Development Division (of DOE)
FEA	Federal Energy Administration
FEO	Federal Energy Office
FERC	Federal Energy Regulatory Commission
FUA	Powerplant and Industrial Fuel Use Act
GAO	General Accounting Office
GNP	Gross National Product

IAB	Industry Advisory Board
IEA	International Energy Agency
IEP	International Energy Program
IPR	Industrial Petroleum Reserve
ISAG	Industry Supply Advisory Group
LNG	Liquefied Natural Gas
MBD	Thousand Barrels Per Day
MER	Maximum Efficient Rate of Production
MMB	Million Barrels
MMBD	Million Barrels Per Day
MMBDOE	Million Barrels Per Day Oil Equivalent
MPH	Miles Per Hour
NATO	North Atlantic Treaty Orgnization
NMMA	National Marine Manufacturer's Association
NPC	National Petroleum Council
NPR	Naval Petroleum Reserves
NRC	Nuclear Regulatory Commission
NSPD	National Security and Plans Development Division (of DOE/EP)
NUR	National Utilization Rate
OAPEC	Organization of Arab Petroleum Exporting Countries
OECD	Organization for Economic Cooperation and Development
OECP	Office of Energy Contingency Planning
OMB	Office of Management and Budget
OPEC	Organization of Petroleum Exporting Countries
PEMEX	Petroleos Mejicanos
SPR	Strategic Petroleum Reserve
TEPR	Temporary Emergency Production Rate
UK	United Kingdom
VAT	Value Added Tax
VEPCO	Virginia Electric Power Company

CHAPTER I

INTRODUCTION

The 1973-74 Arab oil embargo made the Nation--and the West in general--acutely aware of dependence on foreign oil supplies and vulnerability to supply disruption. An oil import disruption threatens our economic well-being, the national, social, and political fabric, and the national security itself.

Since 1973, the President and Congress have formulated numerous energy policies and programs designed to reduce the Nation's dependence on imported oil and speed the transition away from petroleum toward other energy sources. In the process, a new cabinet department was created, billions of dollars were spent on energy programs, and billions more are earmarked for the future.

Despite all this activity, many observers believe the Nation may be as vulnerable today as it was in 1973. On July 15, 1980, Senator Edward M. Kennedy, then Chairman of the Joint Economic Committee's Energy Subcommittee, told GAO that "despite official pronouncements to the contrary, I am concerned that the United States may be in no better position to deal with a foreign oil supply interruption than we were before the 1973 Arab oil embargo." He asked GAO to investigate and evaluate the Department of Energy's present capabilities to manage oil supply disruptions and to provide a comprehensive analysis of its current plans. On July 30, 1980, Senator Charles H. Percy, then Ranking Minority Member of the Senate Permanent Subcommittee on Investigations, Committee on Governmental Affairs, made a similar request, asking GAO to examine how ready the United States is to cope with a major oil supply disruption, and what steps can be taken to improve our readiness.

This report is divided into two volumes. Volume I is a summary report which includes all our conclusions and recommendations. These can be found in Chapter V. Chapter I of Volume I describes our current state of readiness, while Chapters II, III, and IV summarize our preparedness in the various contingency planning areas.

Volume II discusses in much greater detail the problems posed by an oil import disruption, the state of emergency planning, and alternative approaches to coping with disruptions. Chapters I and II of Volume II introduce the subject and describe the serious threat to national well-being posed by oil import disruptions. Chapters III through VIII of Volume II discuss the question "What happens if the oil stops flowing tomorrow?" Answers are discussed by examining past and current policies, programs, and organization for dealing with imported oil disruptions.

Chapters IX-XIII of Volume II ask "What should we do to prepare?" The discussion here revolves around what improvements in

present plans and what new programs in each area should be developed to cope with future cutoffs.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objectives of this study are to evaluate present U.S. energy preparedness planning for oil import disruptions and recommend policy options to improve preparedness.

The scope of energy contingency planning generally encompasses increasing oil supply, substituting for oil, demand restraint, allocation and pricing policies, and international programs. Examples of programs to increase supply include increased oil production and oil stock drawdown. Examples of substitution include switching from oil to gas, coal, or other fuels. Demand restraint involves emergency temporary action to bring energy consumption into line with curtailed supplies. Such programs are sometimes described as "emergency conservation" measures. Allocation programs distribute petroleum in ways which would not be done by markets left to themselves. Gasoline rationing and standby crude oil and product allocation systems are examples. Unregulated markets or marketlike mechanisms such as taxes are alternatives to allocation. International programs include all the above areas; however, they deserve to be considered separately, since they are carried out under the auspices of the International Energy Agency (IEA).

In 1980 the Secretary of Energy summarized DOE's thinking on the likely size of future shortfalls when he remarked that the United States must be prepared for three levels of world oil supply disruption: 2-3, 4-10, and 12-18 million barrels per day (MMBD), and lasting for a year. These represent, he said, losses to the Nation of less than 1, 1-3, and 4-6 MMBD, and roughly correspond to the loss of one medium volume oil producing country in the Persian Gulf, the loss a major producer or three medium volume countries, and the catastrophic loss of a major part of the Persian Gulf, respectively.

We selected an oil supply disruption of 3 MMBD to use as a benchmark for examining the present capabilities of U.S. contingency programs. Our purpose in concentrating on a single disruption possibility is to simplify the presentation of a complex subject and put it in proper context.

There are several reasons why we selected a disruption of 3 MMBD. First, it is a substantial shortfall, significantly greater than anything the United States has previously experienced. Since large disruptions are a real possibility, we believe it is important to examine the Nation's ability to deal with them. Second, a disruption of this size would be sufficient to trigger the International Energy Agency's emergency oil sharing system. The United States is a member of the IEA and has important obligations to it which significantly affect the design and operation of all our contingency programs. Because of this and since the IEA emergency program has never been tested by a real disruption,

we believe it is important to examine a disruption scenario in which the IEA program could be called into operation. Finally, the 3 MMBD case falls roughly midway between the best and worst case disruption possibilities. As such, it provides a useful basis for examining the degree to which the Nation's present contingency programs are likely to be capable of handling both larger and smaller disruptions.

To determine how well the U.S. could cope with a disruption of this size, we identified criteria for evaluating present contingency programs.

The most obvious and important characteristic of a contingency measure is that it produce, or at least have the potential to produce, significant benefits. The most apparent benefits would be producing or saving oil. Other important benefits could be restraining the price hikes which accompany shortfalls or helping counteract the confusion and uncertainty which can cause panic buying, gasoline lines, or other serious inconveniences.

Probably the second most important characteristic of contingency programs is that they be fully developed and ready for use. Government programs must be supported by adequate legal authorities, a current issue because of the scheduled September 30th expiration of the Emergency Petroleum Allocation Act (EPAA, P.L. 93-159) which is the legal basis of many present contingency programs.

We analyzed how these programs have fitted into the Nation's overall emergency preparedness, since Congress might choose to renew or otherwise extend the authority for one or more of them.

While appropriate legal authority is undeniably needed, it is by no means enough to guarantee effective contingency actions. Programs must have the capacity to carry out their objectives, and this means that they must be fully developed and kept ready. While this may seem obvious, it has often been ignored in the past. For example, gasoline allocation authority had existed for six years prior to the Iranian oil shortfall in 1979. However, that crisis caught the Government by surprise and its efforts to allocate on the basis of inadequate regulations, procedures, and staff were chaotic, despite the fact that the disruption was small.

Even if a measure is ready for implementation, its success can only be assured if it can be implemented in a timely manner. Generally, contingency measures must be activated quickly, but even more important, planners must know how long it takes to get each program functioning adequately so that the size of the response closely matches the size of the shortfall. Thus, examination of timeliness was a major theme of our investigation.

Another crucial aspect of contingency planning is coordinating and consulting with affected groups both inside and outside government. This has the dual purpose of soliciting these groups' suggestions and criticisms of each plan and educating them on how

they fit into the plan. Each program was also examined to see if it had been adequately coordinated.

Compliance monitoring and enforcement are important to assure that programs are effective. Since oil crises are accompanied by considerable confusion, it probably will not be apparent if each measure is having its intended effect. Thus, planning for monitoring beforehand is important and this characteristic was also part of our evaluation.

Finally, testing is important, both for the light it sheds on readiness in general and to expose unexpected consequences which the programs may have. We checked on whether present programs had been adequately tested.

These same characteristics were applied to policy options, and the ones suggested in this report had, or at least could potentially have, these characteristics.

The method we used to examine whether current plans had these characteristics and whether improved programs could have them varied somewhat depending on which area was being examined. However, our approach in all areas had some things in common. We relied extensively on both interviews with DOE officials and analysis of DOE documents--especially a large number of contingency action plans. We also analyzed many laws and regulations relevant to contingency planning. These included the Emergency Petroleum Allocation Act, the Naval Petroleum Reserve Act (P.L. 94-258), the Energy Policy and Conservation Act (EPCA, P.L. 94-663), the Emergency Energy Conservation Act (EECA, P.L. 96-102), crude oil and product allocation regulations, environmental regulations governing fuel uses, and many others. We also had the benefit of a number of non-governmental analyses, including those of the National Petroleum Council, the Harvard University Energy and National Security Research Project, and the colloquium on "Contingency Planning for an Energy Emergency" held at Stanford University in June 1980. 1/ Finally, we had many contacts with private individuals involved in aspects of contingency planning and policy.

To evaluate planning in the area of increasing oil supplies we also spoke with officials of the United States Geological Survey, the State of Alaska, the American Petroleum Institute, the National Petroleum Council, and the Texas Railroad Commission. These officials provided considerable information on industry oil stocks, surge oil production capabilities, and Federal royalty oil. At the request of several members of Congress, GAO has been publishing periodic reports on the status of the Strategic Petroleum Reserve since September 1980, which were useful in our evaluation

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1/National Petroleum Council, Emergency Preparedness for Interruption of Petroleum Imports into the United States (Washington, D.C.: National Petroleum Council, 1981). Deese, David and Joseph Nye, Energy and Security (Cambridge: Ballinger, 1981).

of the readiness of the Reserve. Three statistical publications which were especially useful on industry stocks were DOE's Weekly Petroleum Status Report and International Energy Indicators, and British Petroleum's Statistical Review of the World.

To evaluate current and potential fuel switching programs, we held discussions with--besides DOE--the Environmental Protection Agency and the National Petroleum Council (on oil-to-coal switching); the American Gas Association, Gas Research Institute, and the National Petroleum Council (on oil-to-gas switching); the National Electric Reliability Council and several electric utility companies (on electricity transfers); and the American Gas Association, Gas Research Institute, National Petroleum Council, Federal Energy Regulatory Commission, and U.S. Geological Survey (on emergency gas supply). Here again, considerable analysis of laws and regulations of both the Environmental Protection Agency and DOE was necessary since environmental impact is a major concern in the fuel switching area.

In demand restraint, analysis of two laws--EPCA and EECA--was particularly important as both have hindered effective demand restraint planning. We also had the benefit of detailed studies on the impact of demand restraint measures by the Massachusetts Institute of Technology and the Argonne National Laboratory. 1/ We did a case study of a 1979 DOE proposal to ban sales of fuel for recreational watercraft on weekends to illustrate that poorly prepared and presented demand restraint measures can damage the potential for developing viable demand restraint programs. In discussing future directions for demand restraint, we analyzed 380 proposals gleaned from over 20 studies according to a set of criteria emphasizing effectiveness and practicality.

Evaluation of petroleum allocation and gasoline rationing also relied heavily on analysis of relevant laws and regulations. Past GAO work--26 reports since 1974--on allocation was also extensively used, especially a major audit of the operation of the gasoline allocation program during the 1979 Iranian oil shortfall.

Finally, in order to examine the effectiveness of present international programs, we used materials collected by GAO in our recent review of U.S. participation in the International Energy Agency. 2/ We relied on the results of this review and conducted additional analyses of DOE and IEA documents. International

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1/Massachusetts Institute of Technology, Center for Transportation Studies, Economic Regulatory Impact Analysis of Standby Conservation Plans, July 31, 1979. Argonne National Laboratory, Regulatory Analysis for Title II of the Emergency Energy Conservation Act of 1979 (EECA), August, 1980.

2/U.S. General Accounting Office, "Unresolved Issues Remain Concerning U.S. Participation in the International Energy Agency," ID-81-38, September 8, 1981.

energy statistics also played a prominent role in our effort. We found the OECD's Quarterly Oil Statistics particularly helpful in evaluating the emergency oil sharing system and IEA emergency oil stock policies.

Past GAO work

Since 1974 we have issued over 40 reports concerning energy contingency policies and programs, evaluating DOE's and the Department of State's abilities to manage an energy supply shortage. Many of these reports have focused on specific energy contingency programs (i.e., petroleum allocation and pricing programs, the International Energy Program, the Strategic Petroleum Reserve), energy sources (i.e., petroleum, natural gas, gasoline, propane, and naptha) and shortfalls (natural gas curtailments during Winter 1976-77, the Iranian oil cutoff of 1979). Other groups have also reported on DOE's effectiveness in contingency planning, including the Task Force on Regulatory Review of Contingency Allocation Regulations, the Presidential Task Force on Reform of Federal Energy Administration (FEA) Regulations, FEA and DOE consultants, and DOE's Office of the Inspector General. These many reports found and recommended correcting deficiencies in:

--contingency planning for energy emergencies,

--the adequacy and accuracy of data on energy emergencies,

--coordination among Federal, State, and local governments on energy supply problems,

--compliance and enforcement activities, and

--regulatory program management.

This is our first report since October 1978 which provides a comprehensive review of DOE's energy contingency planning effort. This review focuses on contingency planning for a major oil supply disruption on the assumption that oil supply disruptions are both the most likely and serious potential energy emergencies facing the U.S.

CHAPTER II

VULNERABILITY TO FOREIGN OIL SUPPLY

DISRUPTIONS THREATENS THE NATION

The United States, Europe, and Japan are heavily dependent on foreign oil. These countries, with the exception of the United Kingdom, are at least as dependent on imported oil as they were during the Arab Oil Embargo of 1973. The United States currently imports nearly two fifths of the oil it consumes (37 percent in 1980). West European countries import about 90 percent of their oil, and Japan virtually 100 percent. Regionally, all are especially dependent on oil imported from the Persian Gulf area. In 1980, the United States obtained 27 percent of its oil imports from the Persian Gulf, while Western Europe obtained 57 percent, and Japan 69 percent.

As a result of this substantial dependence, the United States and other oil importing countries are highly vulnerable to supply disruptions, particularly ones that include Persian Gulf countries. There are a variety of ways in which disruptions can occur. Among these are: (1) reduced oil production and exports by a major oil producer(s) due to changing economic circumstances and producer government objectives, or as a result of internal political instability or civil war; (2) politically inspired embargoes or production cutbacks; (3) terrorism and sabotage directed against oil producing fields, refineries, and transport facilities and sea lanes; (4) regional warfare; and (5) external aggression against oil producing nations.

The Iranian revolution has demonstrated again how volatile the Persian Gulf region is. Iran, which was the world's second largest oil exporter, drastically reduced its oil production in late 1978 and early 1979. This was partly a result of the political, social, and economic turmoil that accompanied the revolution. It also resulted from an expressed determination of Iran's new leaders to husband their oil resources and to abandon the Shah's grandiose policies of economic development and military armament. Consequently, Iran's pre-revolution production of nearly 6 MMBD fell to 3 MMBD in 1979--resulting in a loss of nearly 3 MMBD to the world market. Subsequently, in September 1980, war broke out between Iran and Iraq and quickly led to a near cessation of both production in and exports from both nations.

Recent political, economic, social, and religious developments in Saudi Arabia, the world's largest oil exporter, have also raised concerns about its future political stability, and in turn its oil production and export policies. Saudi Arabia has reportedly been producing oil at a rate several million barrels a day above what it needs to finance its internal needs and economic development. Following the Iranian revolution the Saudis began producing 1 MMBD above their 8.5 MMBD production ceiling. Initially, they did this to help offset the lost Iranian oil. They continued the higher production to prevent tightening in

the world oil market, to dampen upward pressure on prices, and to try to persuade other OPEC members to adopt a unified and more restrained pricing scheme. More recently, the Saudis have increased this production nearly another 1 MMBD to help offset the oil losses resulting from the Iran-Iraq war and to maintain pressure on other OPEC nations to adopt the Saudis' view of an appropriate pricing policy. Nonetheless, some elements within the ruling order have felt that Saudi Arabia has been producing more oil than is necessary for the country's interests. Some outside observers fear that rapid changes which are accompanying Saudi economic development may destabilize the present order, leading to lower oil production and more radical pricing policies.

Meanwhile, the Soviet invasion of Afghanistan has prompted fears that the Soviet Union might use its new position to seize control of the Gulf's oil resources. While the Soviet Union is the world's largest oil producer, the CIA has predicted that Soviet oil production will fall behind Soviet energy needs in the 1980s. The Soviets, who have been an exporter of low-priced oil to their East European allies, have already informed the East Europeans that they can no longer count on the Soviet Union to meet their oil needs. This poses a serious problem to East Europe, since their economies are stagnating and could scarcely afford the additional expense of buying Middle Eastern oil at world prices.

Among the greatest threats to the Middle East oil supply is the continuing conflict between Israel and the Arab world. The Camp David accords have brought peace between Israel and Egypt, but no other Arab nations have begun peace negotiations. Moreover, Egypt and Israel have been unable to reach an agreement on the West Bank and the Gaza Strip, which in turn threatens to derail the peace process. Israel's policies of expanding settlements on the West Bank and its formal annexation of East Jerusalem have further angered the Arab states, especially Saudi Arabia. In August 1980 the Saudi Crown Prince called for a holy war to end Israel's occupation of East Jerusalem and the West Bank. More worrisome were reports that the Saudis were holding discussions with other Arab oil exporting countries to coordinate drastic production cuts if the West did not pressure Israel to abandon its East Jerusalem policy. The precedent of the 1973-74 Arab oil embargo and Saudi Arabia's continued opposition to Egypt's effort to negotiate peace with Israel make future production cutbacks and/or embargoes tied to the Arab-Israeli conflict a possibility.

Additional Middle East/Persian Gulf wars can result from yet other rivalries that exist in the region and could lead to destruction of oil production and exporting facilities. The war between Iran and Iraq is a case in point, representing the most serious threat to Persian Gulf oil since the 1973 Arab Oil Embargo. The war broke out in September 1980, after months of border skirmishes. It quickly escalated to include air raids deep into each other's territory, and air, naval, and ground attacks on oil refineries, pumping stations, pipelines, and loading terminals. Iran's

mammoth oil refinery at Abadan was at least partly destroyed and its huge computerized oil loading terminal at Kharg Island was damaged.

Until this war it had been assumed that even open hostilities between Middle East oil producers would not bring attacks on their respective oil fields and related facilities. However, as the present war demonstrates, one cannot count on a fine sense of economic rationality to prevail in the heat of war. Moreover, and more worrisome to the oil importing nations of the world, Iran hinted that it was prepared to seize control of or mine the Straits of Hormuz if other countries came to the aid of Iraq. Nearly 90 percent of the Free World's oil imports pass through those narrow straits which separate Iran from the states of the Arabian Peninsula. Mining the Straits, sinking ships in the channel, or bringing the channel under gun and missile fire could block most exports of oil out of the Gulf.

The war initially removed about 4 MMBD of oil from world markets. However, the shortfall has not caused a panic on international oil markets for several reasons. First, before the war industry sources indicated a worldwide oil production surplus of between 1 to 3 MMBD. Second, world oil stocks were very high. Third, some oil producing nations with unused production capacity increased production, offsetting some of the shortfall. Most notable of these was Saudi Arabia, which increased production another 1 MMBD. Fourth, several oil exporters said they would make special efforts to send oil to those countries which had been heavily dependent on Iranian or Iraqi oil and which did not have large oil stocks to see them through a shortage period. Fifth, world demand for oil has been depressed as a result of the dramatic price increases of 1978 and 1979 and from economic downturns in industrialized countries. Sixth, although the war between Iran and Iraq continues, their attacks on each other's oil facilities have abated. As a result, their production has been gradually increasing--reaching 2.2 MMBD in January 1981, compared to 4.7 MMBD before the war began.

However, if the war should drag on and spread to other producing nations, significant shortage and price problems could easily occur. Consequently, until the war is ended, it will continue to represent a threat to Persian Gulf oil and the security of the Western World.

A final and continuing source of concern regarding Persian Gulf oil is the threat of terrorism and sabotage. The oil production and export facilities of the Persian Gulf oil producers are highly vulnerable to such acts, as are the Straits of Hormuz. Terrorism or sabotage could be perpetrated by dissident groups within the various countries or by one country against another. It has been estimated that a small number of well-trained terrorists could inflict considerable damage on key production and transport facilities and that it could take a year or longer to repair them-assuming that repair crews were able to move about freely in the area. During the early part of 1980, when the

President was hinting at the possibility of using force, if necessary, to secure release of the American hostages from Iran, Iranian officials threatened to sabotage oil facilities in the Persian Gulf to block all movement of oil out of the Straits of Hormuz.

EFFECTS OF A MAJOR OIL SUPPLY DISRUPTION

The United States has not yet experienced a truly large oil supply disruption. During the 1973-74 Arab oil embargo the average U.S. oil shortfall was about 1 MMBD. The embargo was relatively short, lasting from mid-October to early April. There has been considerable debate about whether the United States experienced any net shortfall during the 1979 Iranian oil interruption. Other producing nations increased oil production to offset the loss of Iranian supplies. At maximum, the U.S. may have been short about 500 MBD, less than 3 percent of total oil consumption.

To address the question of our reaction to a large disruption, we will assume that the United States loses 3 MMBD of oil imports. We also assume that existing energy contingency programs do not cope with this shortfall. (The body of this report shows where our existing programs are now inadequate and what is needed to improve the Nation's preparedness.) We also confine our discussion to what would happen during the immediate term (1 day to 3 months) and the near term (4 to 12 months). This 3 MMBD shortfall would reduce U.S. supply by approximately 18 percent.

Impact on the energy sector

An interruption of oil from the Middle East would begin to reduce landings in about 60 days--the time it would take for the last tankers to reach U.S. ports. In spite of this "cushion" the disruption would have an immediate impact, particularly on gasoline demand and stockpiling of crude oil and petroleum products.

Consumers have been conditioned by previous shortages to expect serious difficulties obtaining gasoline so a disruption of this size would probably have an immediate impact on gasoline demand. Regardless of whether actual shortages exist in gasoline stocks at the time of the disruption announcement, drivers across the nation are likely to rush to the pumps. Panic buying will in turn lead to gas lines and actual, as opposed to perceived, temporary gas shortages.

The price of gasoline has risen sharply since the beginning of 1979, up about 100 percent. Even before this increase, the cost of gasoline had become a significant expense to consumers. Rather than driving consistently with a full tank--in effect, carrying an expensive personal gasoline stockpile--most consumers prefer to empty gasoline tanks before refilling them. Refiners and retailers, in turn, base their gasoline demand projections in part on the normal purchasing behavior of consumers. Since

this behavior usually changes slowly, they adjust slowly. When buying patterns change rapidly, refiners and retailers are overwhelmed. This is precisely what happens when a major disruption occurs.

The magnitude of the gasoline inventory problem is staggering. There are approximately 100 million passenger cars registered in the United States. They are filled up about once a week and carry a "rolling" gasoline inventory of approximately one-half tank. If each consumer decides to fill his tank every four days--when it's only half instead of almost empty--the demand for gasoline above normal levels would be over 300 million gallons. Clearly, even a fraction of this response, if unanticipated, would cause havoc at the pump.

As desired stock levels in personal gasoline inventories are reached, the initial surge in gas demand will taper off. Lines, however, will probably remain throughout the immediate period, as service stations respond to dwindling supplies by reducing hours and profiteering through tied sales.

Even if gas prices are controlled to some degree by the government, gas station owners will profiteer through tied transactions. Rather than wait in long lines, affluent consumers will purchase ancillary services in return for preferential treatment at the pumps. Fillups will be accompanied by minor repairs at service stations which remain closed to the public through most working hours.

Panic purchases aside, motor fuel will bear the brunt of the shortfall during the near term. This is because the Government believes discretionary gasoline use is greater than usage of other petroleum products, and can be reduced considerably with minimum hardship. If the entire curtailment falls on gasoline, it will reduce available supplies by about 50 percent. These figures represent the extremes, but even small cuts imply substantial changes in American lifestyles, which would be deeply resented by most citizens.

Concerning heating oil, no changes in effective demand or availability are expected in the immediate term. In most cases, fuel oil deliveries are controlled by contracts and oil distributors will probably not honor panic demand that taxes their inventory. The Government ordered refiners to "tilt" production toward distillate or heating oil at the expense of motor fuels in 1979 during the Iranian oil shortfall and could legislate such a program in a future disruption. Fuel oil prices will begin to rise sharply, however, and some profiteering will occur within the fuel oil delivery chain.

There will be substantial cuts to industrial users with interruptible contracts almost at once. Those firms with dual fuel burning capability will begin seeking alternative energy contracts, and those without will begin planning to curtail

plant operations. Cutbacks should not occur immediately, however, since no actual shortage of fuel will exist for much of the first three months and most interruptible contracts have grace periods. When cutbacks do occur, the effects may be severe. Most firms have trimmed the fat from their energy demand since 1973 and now have less leeway to achieve large conservation gains without cutting production. In any case, production will be affected as consumers curtail their buying.

Impact on the social sector

Social stress will follow the annoucement of the oil shortage. Since the U.S. has rarely experienced resource shortages, people have little experience in coping with them, and little tolerance for the inconvenience and hardship they entail. During the 1979 shortage, gas line frustrations, coupled with anger generated by a feeling of helplessness on the part of the consumer, led to more than occassional violence at gas stations. A similar response can be expected in the future, particularly during the immediate aftermath of a shortage announcement, when gas lines, consumer uncertainty, and general confusion over government and industry policies will be rife.

A good deal of xenophobia is likely to develop as scapegoats are sought to dissipate feelings of helplessness. Mob violence, and ugly incidents involving foreign-born or simply foreign sounding or looking U.S. residents, may occur. Finally, as in past oil disruptions, multinational oil companies will be suspected of exacerbating the Nation's problems and rumors concerning inventory hoarding at company storage areas and tanker diversions to foreign ports will abound. While violence at the pumps and xenophobic excesses should decline sharply as distribution becomes smoother and gas lines shorten, citizen suspicion of oil companies will persist throughout both the immediate and near term.

The Government response

The Federal Government does not presently have an emergency plan adequate to cope with a sudden and substantial shortage of imported oil. As a result, measures taken in the wake of a shortfall are likely to be ad hoc, experimental, full of interagency confusion, and poorly coordinated with emergency measures undertaken by the States.

For example, the Federal Government may impose some or all of the following measures which were part of its response to the Iranian cutoff (authority for some of these measures will expire September 30, 1981):

--trying to persuade State governments to immediately establish "half tank" and odd/even gasoline distribution rules;

--imposing some "tilt" regulations on refiners to assure adequate supplies of home heating oil;

--controlling energy prices during the immediate period to prevent profiteering; and

--imposing demand restraint measures such as thermostat controls in commercial buildings.

If the disruption continues, other measures may be used such as

--imposing a gasoline rationing program, and

--overriding through emergency legislation existing impediments to nuclear development and environmental safeguards which have hampered the speed of alternative fuels development and burning dirtier fuels.

These programs in the past met with little success and even exacerbated the problem by allocating oil to noncritical uses or areas where the shortfall was least serious.

Impact on the economic sector

During the immediate period, amidst chaos in international oil markets, U.S. consumers' confidence and the stock market will plunge. Declining auto sales will lead to a sharp drop in the demand for durable goods, as buyers postpone or abandon plans to purchase energy-intensive products and begin increasing savings due to anxiety concerning future U.S. economic performance. If behavior during previous periods of great consumer anxiety such as the 1973 oil embargo and 1962 Cuban missile crisis is any indication, hoarding will quickly develop and lead to massive purchases of such items as candles, sterno, flashlights, canned goods, and toilet paper. As a result, shortages in a wide variety of products may appear after the announcement of an oil import shortfall, further frightening the consuming public. Business retrenchment in response to declining sales and unanticipated inventory increases could further exacerbate the drop in U.S. economic activity.

It is not possible to precisely estimate the overall costs of oil supply disruptions. Many factors can affect the outcome, including the size and length of the disruption; oil price rises which accompany the shortfall; the nature of the world oil market at the time (i.e., glut versus scarce supplies, availability of excess production capacity, etc.); the status of the U.S. economy and that of other major oil importing nations (i.e., characterized by growth, stagnation, recession); the economic policies adoptd by the Government to cope with the situation; and the kinds of energy contingency programs and policies available to deal with the disruption.

However, through the use of macroeconomic models, one can estimate the economic costs likely to result from various oil shortfalls. A June 1980, study by the Congressional Budget Office

(CBO) estimated the macroeconomic effects of several oil supply interruptions, varying between 1 and 5 MMBD and beginning in 1984 and lasting for one year. Table 1 summarizes the results: a 3 MMBD shortfall is estimated to produce a GNP loss of about $225 billion (1980 dollars), increase inflation by 15 percentage points and unemployment by 1.8 percentage points. These estimates assume no drawdown of the SPR, no price controls in effect, and an allocation of petroleum different from and more efficient than that provided for by the Energy Policy and Conservation Act

TABLE 1

CONGRESSIONAL BUDGET OFFICE ESTIMATES OF MACROECONOMIC IMPACTS OF VARIOUS OIL SUPPLY INTERRUPTIONS IN 1984

Daily Shortfall (MMBD)	Percent of Projected Imports	Lost GNP		Increase In Projected Inflation Rate (% Points)	Increase in Projected Unemployment Rate (% Points)
		In Billions of Dollars	Percent of Projected GNP		
1	10.5	66	1.6	3	0.5
2	21.5	146	3.6	7	1.1
3	31.6	226	5.5	15	1.8
4	42.1	306	7.5	25	2.2
5	52.6	387	9.4	31	2.8

SOURCE: Subcommittee on Energy and Power, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, "An Evaluation of the Strategic Petroleum Reserve" (Washington, D.C.; U.S. Government Printing Office, June 1980).

(EPCA) of 1975. CBO calculated that if EPCA allocation regulations and price controls were in effect, the GNP loss would nearly double from $226 billion to about $400 billion.

It needs to be stressed that all of the above GNP loss figures are conservative since they estimate the losses which would occur during the disruption. In fact, however, the economy does not immediately rebound to its former level at the end of a disruption. During a major disruption, millions of workers become unemployed and inflation increases dramatically. A considerable period of time is required for the economy to readjust once oil becomes available again. Both business and consumers need to regain confidence in their economic outlook and resume spending and investment at previous levels. Overall, several years may be required for the economy to fully recover. The GNP losses during the years beyond the interruption itself are just as real, and would be a continuing burden on the Nation. The added GNP losses

which would occur in the next several years as the economy regains its former level could conceivably equal those for the year of the interruption.

These GNP loss figures do not include the added cost to the Federal Government which would accompany increased unemployment and inflation. Nor do they include the costs which result from permanent increases in the price of oil, which were staggering for the two disruptions in the 1970's. During the 1973-74 Arab Oil Embargo the price of OPEC oil increased four fold. During the far more limited Iranian shortfall of late 1978 and early 1979, the world price of oil more than doubled. These price increases have hurt the oil importing nations of the world through massive balance of payments problems, inflation, and reduced growth.

CHAPTER III

INCREASING OIL SUPPLIES

One of the seemingly easiest and least painful ways to cushion the effects of an oil supply disruption is to provide additional oil supplies. The United States has 3 major ways to do this--temporarily increasing domestic production and drawing down Government and private oil stocks.

The National Petroleum Council (NPC) estimates that in 1981 an additional 326 MBD of crude oil could be domestically produced and delivered for 6 to 12 months with minimum risk of reservoir damage or loss of ultimate recovery. However, capability for emergency production will decline as fields become depleted. Stocks in the Government's Strategic Petroleum Reserve (SPR), although much lower than originally planned, totalled about 177 MMB as of mid-August 1981, and could be drawn down by a maximum of 1.6 MMBD for about 40 days, at which point the rate would decrease until the SPR is exhausted 5 months later. While the exact amount of privately held stocks which could be drawn down without adversely affecting industry operations is unknown, at least 100 to 200 MMB could be provided, and even more if storage capacity were full.

DOE has not developed specific plans for increasing domestic production or drawing down the SPR. The NPC estimates that to increase domestic production will require an investment of $30 million. Action to remove legal and regulatory constraints is also required. Most parties feel the SPR should not be drawn down, except in a very severe emergency, until it reaches a level of at least 250 and possibly 500 MMB. While a contingency plan has been drafted to identify and draw down private stocks, DOE lacks the data needed to do so effectively. Moreover, its authority to manage stocks expires after September 30, 1981. Therefore, while temporarily increasing domestic oil supplies holds great potential to cushion the shock of reduced imports, the United States is presently ill-prepared to increase them.

INCREASED DOMESTIC OIL PRODUCTION

A comprehensive contingency plan for increasing non-Federal domestic oil production does not now exist. However, DOE has drafted a plan on increasing production for the Naval Petroleum Reserves which could provide about 25 MBD for 90 days.

Most of DOE's efforts to increase oil production have concentrated on improving data and identifying constraints. According to DOE officials, sufficient data on production capacities has not been available to design an action plan to encourage or mandate increased production. In an effort to acquire that information, DOE asked the National Petroleum Council to assess the opportunities available for emergency increases in domestic oil production. The NPC, which has been examining numerous options for dealing with oil disruptions, recently completed a report on

this subject. 1/ The study indicates that an additional 326 MBD of crude oil (including Federal and non-federal production) could be produced and delivered in 1981 for a period of six to twelve months with minimum risk of reservoir damage or loss of ultimate recovery. Half of the total could be available within 2 months of the onset of a crisis, the remainder in about 4 to 6 months. However, financial, legal, and regulatory barriers must first be overcome.

About 78 percent of the increased production would come from the Prudhoe Bay and the East Texas Fields. The surge emergency production that could be delivered from each field in 1981 is shown below.

NPC Estimates on
Emergency Oil Production

Field	MBD
Prudhoe Bay (Alaska)	100
East Texas (Texas)	154
Yates (Texas)	50
Tom O'Connor (Texas)	6
Naval Petroluem Reserve at Elk Hills (California)	16
Total	326

According to the study, the capability for emergency production will decline as fields become depleted. By 1985, the maximum surge oil potential will decline to 143 MBD, most of this coming from the East Texas Field. The lead time for this surge production ranges between 4 and 6 months. Less than 25 MBD could be available over the first four months of the emergency in 1985.

Constraints

Obtaining additional production involves overcoming 3 kinds of constraints--financial, legal, and regulatory. First, production and pipeline facilities must be modified, about a four to six month process according to the NPC. The Council also estimates financing could be a problem with capital investments amounting to $30 million. Private industry has no incentive to invest in facilities solely for contingency purposes unless they can secure an adequate return. The Government would need to determine whether to absorb the cost or design programs to encourage private companies to invest.

1/National Petroleum Council, Emergency Preparedness for Interruptions of Petroleum Imports Into the United States, (Washington, D.C.: National Petroleum Council, 1981).

Increasing oil production also requires removal of legal and regulatory barriers. Current production levels are generally limited by Federal and State regulation to the maximum efficient rates of production (MER's) which were established to preserve natural resources and avoid waste.

In identifying emergency surge production potential the NPC assumed that the appropriate regulatory agencies will approve production above the MER. Several agencies would be involved. The State of Alaska would have to approve higher offtake production rates for Prudhoe Bay. The authority to increase production above the MER for the Texas fields rests with the Texas Railroad Commission. Under the Energy Policy and Conservation Act (EPCA), the President may order production for fields in any State that has established a temporary emergency production rate (TEPR) which is a rate higher than the MER during an emergency. DOE can determine the temporary emergency production rate for fields on Federal lands and for unitized fields covering both Federal and nonfederal lands where the State has not made a determination. The EPCA provisions do not apply to Elk Hills, so permitting emergency production above the MER there will require an amendment to the Naval Petroleum Reserve Production Act of 1976 which governs Elk HIlls production.

According to the NPC, conservation and environmental regulation concerning gas flaring and emission limits might also present problems to increasing oil production. If such regulation needs to be relaxed, the process could be time consuming, especially if public hearings are required.

Production from the Naval Petroleum Reserves

DOE provided us a draft action plan for increasing production of the Naval Petroleum Reserve at Elk Hills, California, in the event of an oil supply crisis. The plan outlines a series of response actions, specifies the implementation process including action schedule, organizational structure, roles and responsibilities, and provides an estimate of how much additional crude oil could be made available if the action was successfully implemented. The plan adequately addresses most aspects of contingency planning. However, as noted earlier, emergency provisions of the Energy Policy and Conservation Act (EPCA) do not apply to Elk Hills production. Hence, before this action plan could be implemented, Congress must legislate to permit production above the maximum efficient rate.

Elk Hills is currently being produced at the MER, 160 MBD. DOE's proposed action plan would increase production above the MER by about 15 percent or 25 MBD for about 3 months. The NPC study indicates that about 16 MBD could be secured for 9 months, but with a 1 percent loss in ultimate recovery. The potential for increasing production from other Federal lands has not been established.

According to DOE's plan, once the President has ordered implementation, it will take at least 70 days for higher production to begin. Under normal circumstances, increased production will end automatically after 89 days or earlier if warranted.

Conclusions

The United States could produce and deliver an additional 326 MBD of crude oil temporarily to meet an emergency, according to NPC estimates. This potential refers to production from non-Federal and Federal fields above the maximum efficient rate for a 6 to 12 month period with minimum risk of reservoir damage or loss of ultimate recovery. To acquire this additional oil will require removing State and Federal regulatory impediments, seeking changes to existing laws and modifying production and pipeline facilities. No plan has been prepared to address these constraints. And the required coordination with the States and U.S. Congress has not taken place.

THE STRATEGIC PETROLEUM RESERVE

In order to diminish U.S. vulnerability to the effects of a severe oil supply interruption and to carry out U.S. international energy commitments, the Energy Policy and Conservation Act authorized the creation of a Strategic Petroleum Reserve (SPR) to store up to 1 billion barrels of crude oil. A Strategic Petroleum Reserve Office was created to establish, manage, and maintain the Reserve. The potential value of the SPR has been characterized by the Secretary of Energy as "by far the most effective program for reducing the cost of oil market disruptions." However, the current volumes of SPR oil would probably not be used except to meet a very severe energy disruption threatening national security, health, and safety.

DOE has experienced serious difficulties in developing storage facilities and acquiring oil for the SPR. As of mid-August 1981, the SPR contained only about 177 MMB of oil, far short of earlier expectations. Should the United States begin to experience an oil import shortfall, the 177 MMB could only be drawn down at a maximum of about 1.6 MMBD (the current maximum drawdown rate) for about 40 days--at which point the drawdown rate would decrease until the SPR was exhausted about 5 months later.

DOE's SPR drawdown plan, as approved by Congress, does not specify under what conditions or how the SPR would be used, i.e., amount, rate, timing, or method of distribution. It also does not identify an amount which should be held in reserve for the most extreme emergencies. We believe the plan should be integrated with DOE's overall contingency planning, and should at least identify options for SPR use.

Developing the SPR

Congress has authorized an SPR of up to 1 billion barrels. Thus far, plans are developed for storage capacity of up to 750 MMB.

The optimum size of the SPR has been a subject of much inter-agency controversy ever since President Ford recommended a 1 BB strategic storage program in January 1975. The EPCA mandated about a 500 MMB reserve, but authorized up to 1 BB. As required by the Act, the Federal Energy Administration (DOE's predecessor agency) submitted an SPR plan to Congress, in February 1977. It provided for a 500 MMB reserve, a size which the agency estimated would be cost effective for a wide range of interruptions. However, in the first National Energy Plan announced in April 1977, President Carter announced his intention to have a 1 BB SPR in place by 1985. A 1 BB reserve could supply up to 3 MMBD for at least 10 months.

In June 1978 Congress approved an amendment to the SPR plan which officially increased the planned size of the SPR to its fully authorized level of 1 BB for 1985. DOE argued that the larger SPR was needed to account for "slightly higher" estimates of future oil import levels and more severe "worst case" scenarios of possible U.S. import losses than had originally been anticipated.

The previous Secretary of Energy has stated that for the Nation as a whole and under a wide range of assumptions about the future, the expected economic benefits of the SPR far outweigh its cost. Likewise, a CBO analysis concluded that the low cost of the SPR, relative to the economic losses it could avert, make it a highly cost-effective Federal program to offset short-term economic effects of oil supply disruptions. For example, the CBO estimates that for a one-year, 3 MMBD oil import shortfall (amounting to 32 percent of projected U.S. imports in 1984) a 1 BB SPR could almost completely offset the $226 billion in anticipated GNP loss, 1.8 percentage points in unemployment and 15 percentage points in inflation that would otherwise result. As CBO points out, the probability of such a shortfall occurring need not be large to make the expected benefits of a 1 BB reserve outweigh its projected costs. 1/ Nonetheless, the SPR has fallen far behind its implementation schedule for both developing storage capacity and acquiring oil.

Developing storage capacity

DOE is implementing a three-phase plan to develop a 750 MMB oil storage capacity. Phase I, essentially completed in December

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1/Congressional Budget Office, "An Evaluation of the Strategic Petroleum Reserve," June 1980.

1979, involved developing five oil storage sites on the Gulf Coast in Texas and Louisiana with a total capacity of 251 MMB. Phase II involves expansion of three of these sites to bring total storage capacity up to 538 MMB by 1986. Phase III involves developing an additional site and expanding current sites to achieve the 750 MMB total capacity. No decisions or plans have been made concerning the final 250 MMB of capacity that would be required to store the full 1 BB currently authorized.

DOE has experienced serious difficulties in developing storage capacity for the SPR. In past reports we described the technical problems associated with DOE's selection and preparation of existing caverns and mines for oil storage. 1/ DOE has taken steps to resolve many of these problems.

Until recently, obtaining oil was the major problem facing the SPR. However, with soft market conditions and accelerated efforts, DOE has purchased oil for the SPR at a rate of about 300 MBD during fiscal year 1981. Current concerns relate to the amount of storage capacity available in the near to mid-term. This issue is discussed in Chapter IX.

Acquiring oil

EPCA mandated an SPR fill rate needed to put 500 MMB in storage by December 1982. President Carter, in his 1977 National Energy Plan, shortened this schedule by 2 years, and called for an additional 500 MMB by December 1985. In late 1979 DOE had to scale down these goals considerably. In fact, DOE has never met any of these goals for filling the SPR. Its goal now is to fill the 750 MMB capacity by 1989. Various past schedules are set forth below.

1/U.S. General Accounting Office, "Need to Minimize Risks of Using Salt Caverns for the Strategic Petroleum Reserve," EMD-78-25, Jan. 9, 1978, and "Questionable Suitability of Certain Salt Caverns and Mines for the Strategic Petroleum Reserve," EMD-78-65, Aug. 14, 1978.

	EPCA (Dec. 1975)	National Energy Plan (April 1977)	DOE (late 1979)	Actual
		(in millions of barrels)		
Dec. 1978	150	250	---	67
Dec. 1979	---	---	190	93
Dec. 1980	325	500	250	108
Dec. 1982	500	---	---	---
Dec. 1985	---	1,000 1/	---	---

1/750 MMB for Government storage only, 1,000 MMB for government and possible private storage.

The SPR has been handicapped by numerous problems since its establishment as part of the Federal Energy Administration in 1976. These include leadership, placement within DOE's hierarchical structure, and staff size and turnover. When DOE was established in 1977 and received the Federal Energy Administration functions, the SPR Office was initially placed within the Office of the Assistant Secretary for Resource Applications. In the process of establishing DOE, the SPR Office lost a number of its top staff to other units. Unfortunately, this was just the time that the SPR Plan was being implemented. To make matters worse the Office was deprived of badly needed technical staff due to a DOE hiring freeze. Finally, with the establishment of a New Orleans office in 1978, the SPR Office lost 80 percent of its planning staff to implementation functions, and other DOE offices failed to provide staff to continue the Office's contingency planning efforts. Although the position of the director of the SPR was upgraded to Deputy Under Secretary in 1978, it dropped to Deputy Assistant Secretary under Resource Applications in 1979. In February 1981, as a part of DOE's major realignment, the SPR program was transferred to the Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness. A Deputy Assistant Secretary for the SPR oversees the program.

In October 1978 DOE began experiencing delivery problems with SPR oil that had been contracted for earlier. Four contractors failed to deliver 10 MMB of crude oil or 9 percent of all SPR purchases up to that point. Also in late 1978 DOE began experiencing problems in obtaining bids from companies to supply the SPR, due to tight world oil market conditions stemming from the Iranian shortfall. In fact, no contracts were signed after November 1978 and DOE suspended its contract solicitations in early 1979 after they met with only partial bids at prices that DOE considered to be unreasonably high. Deliveries of SPR crude

under previous contracts continued until August 1979. At that point, 92 MMB was in storage, representing about 37 percent of the existing storage capacity or about 2 weeks of supply equivalent to average 1980 crude oil imports.

The primary reason DOE offered for its 1979 decision to suspend SPR crude oil purchases was to avoid putting pressure on the world crude oil market, and particularly the spot market, at a time when prices were rising rapidly. At the Tokyo summit in June 1979, the United States along with six other major oil importing countries pledged to refrain from stockpiling when such activity would place "undue pressure" on world oil prices. 1/

When the world oil market loosened in early 1980, however, DOE failed to resume SPR purchases, citing the Tokyo agreement. The decision was likely reinforced by reports that Saudi Arabia had criticized consumer government stockpiling and had warned that it might reduce its oil production by an equivalent amount. However, DOE maintains that producer country opposition was not the major factor behind either DOE's initial decision to suspend SPR purchases in 1979 or its reluctance to resume such purchases in 1980. 2/

The Congress, then, in June 1980, through Title VIII of the Energy Security Act (P.L. 96-294), required DOE to acquire crude oil for the SPR at an average of at least 100 MBD for fiscal year 1981 and each year thereafter until the SPR is filled. DOE's first approach to Title VIII was to fill the SPR through competitive exchanges of oil from the Naval Petroleum Reserves at Elk Hills, California. Deliveries to the SPR resumed on September 23, 1980. DOE has contracted for 36.6 MMB using such exchanges, thus meeting the minimum supply requirements. DOE has also been soliciting oil on the spot market. As of August 19, 1981, 66.8 MMB had been contracted for this way. DOE has also signed a multi-year contract with Mexico's State oil company for 110 MMB, and expects about 6 MMB to be delivered before the end of fiscal year 1981. This 6 MMB brings the total fiscal year's purchases to about 110 MMB, or an annual rate of about 300 MBD. DOE has actually received this oil at an average rate of 269 MBD. Average monthly

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1/These countries are the United Kingdom, France, West Germany, Japan, Italy and Canada. For more information, see General Accounting Office, "The United States Exerts Limited Influence On The International Crude Oil Spot Market," EMD-80-98, Aug. 21, 1980.

2/We have previously reported on many other problems faced in filling the SPR. For example, see, "U.S. Strategic Petroleum Reserve At a Turning Point--Management of Cost, Oil Supply Problems, and Future Site Development," EMD-80-19, Jan. 2, 1980; Letter to the Honorable James R. Schlesinger, EMD-79-42, March 27, 1979; and "Issues Needing Attention In Developing the Strategic Petroleum Reserve," EMD-77-20, Feb. 16, 1977.

delivery rates have fluctuated between a low in October 1980 of over 100 MBD to a peak of about 513 MBD in May 1981. 1/

Drawing down the SPR

Before the SPR can be drawn down or distributed, the President must determine that such action is necessary due to "a severe energy supply interruption or by obligations of the United States under the International Energy Program." The EPCA defines a "severe energy interruption" as a national energy shortage in which the President determines that the shortage:

--is, or is likely to be, of significant scope and duration and of an emergency nature;

--may cause major adverse impacts on national safety or the national economy; and

--results, or is likely to result, from an interruption in the supply of imported oil, sabotage, or an act of God.

The SPR plan, as transmitted to Congress in early 1977, makes clear that a decision to use the SPR must be an integral part of a comprehensive plan to respond to energy emergencies and to fulfill international obligations. Factors influencing a decision to use the SPR include the state of the economy, the estimated size and duration of the supply interruption, potential reductions in demand through conservation and other measures, and the size and readiness of the SPR itself.

However, the SPR plan does not specify under what conditions the SPR would be used (i.e., amount, rate, and timing of use) or how it would be distributed and priced. Nor does it identify a minimum threshold size which should be built and held in reserve for extreme emergencies. An October 1979 amendment to the plan, entitled "Distribution Plan for the Strategic Petroleum Reserve," also does not specify these items. The plan maintains that it is both infeasible and undesirable to specify the precise conditions in which the reserve would be drawn down. In addition to the large number of variable factors that could influence the decisions, the absence of precise criteria triggering an SPR drawdown is designed to keep potential embargoing producers uncertain of U.S. intentions, and thereby maximize the deterrence value of the SPR.

1/Since September, we have been issuing a series of status reports, as requested by certain members of the Senate Committee on Energy and Natural Resources and House Committee on Interstate and Foreign Commerce, on the administration's activities to implement Title VIII of the Energy Security Act.

A draft SPR use action plan, one of a series of draft plans for energy emergencies, also does not address how the SPR oil could be used, priced, or allocated. The report supports using the SPR as a primary reserve to be initially withheld during a "moderate" disruption and released only if deemed absolutely necessary during "major" disruptions. However, the bulk of the plan describes in detail 50 steps required logistically to draw down the SPR and assumes the decision on use has already been made.

The absence of a specific use plan or set of options leaves decisions made about SPR use subject to ad hoc decisions made during a crisis. The reasons cited for not developing a plan involve legitimate concerns. However, we believe a better way of addressing DOE's concerns is for DOE to develop a plan but not release its details to the public. We do not believe the Department should use national security reasons as an excuse for not developing contingency plans for one of our potentially most valuable tools for use during an energy emergency.

The SPR plan should be integrated with the comprehensive contingency plan being prepared by DOE. This plan is designed for responding to a specific interruption scenario, including size and duration, in the immediate future if necessary. We believe that such a comprehensive contingency plan should at least outline principal options for SPR use including rate, amount, timing, and method of drawdown. The role specified for the SPR should be determined by the availability of alternative response measures and the threshold level below which the SPR would not be used, except for, say, national defense, health, and safety. Details of the plan need not be made public.

Such an SPR drawdown plan would not constitute a decision about SPR use, any more than other parts of the comprehensive contingency plan do. The purpose of a comprehensive plan is to identify the programs which could be used, including their options for use and likely effects. In the event of an actual disruption, such a plan would serve as a basis for preparing a specific set of action proposals, tailored to the nature of the disruption and upon which high level officials could act. An SPR drawdown plan need not identify with certainty whether the SPR would be used and how.

Distribution of SPR oil

Physical capacity to pump oil from storage caverns was not installed until late 1979. When Phase I storage is filled to capacity at 251 MMB, maximum drawdown capacity will be 1.7 MMBD. Phase II, at 538 MMB, will have drawdown capacity of about 3.5 MMBD.

The SPR Plan estimated the oil could, if necessary, be distributed to refineries within 7 weeks after a supply disruption began. This estimate allowed 1 week to recognize the existence and severity of the disruption, 2 weeks to obtain Presidential authorization to use the SPR, 2 weeks to assign allocations of SPR

crude oil to refiners and load tankers, and 2 weeks to transport the oil to refineries.

As noted above, DOE has not determined how SPR crude would be distributed or priced, or when or at what rate it would be drawn down. Regulations adopted in August 1980 provide that at the time a presidential decision is made to draw down and distribute the SPR, decisions would also be made on the best method of allocation and the universe of eligible buyers.

One of DOE's goals is to provide crude oil to refiners quickly. The buyers' ability to transport SPR crude oil to refineries on a satisfactory schedule could become a significant factor in buyer selection. DOE might therefore decide to limit the universe of eligible buyers to those capable of moving the crude oil to refineries within a specified schedule. Likewise, in the case of regional product shortfalls, sales could be limited to firms which supply or could supply specific products to the affected area.

Alternative methods of distributing SPR crude include allocating it to domestic refiners in accordance with criteria announced at the time or by competitive bidding. DOE could also reinstate the standby allocation programs under EPAA and distribute SPR crude under them. However, this authority expires September 30, 1981.

Regulations provide that in cases other than competitive sales, SPR crude would be priced at about the average landed cost of imported crude for the allocation period. In all cases, sales of SPR oil would be limited to refiners, minimizing opportunities for retrading for profit and to encourage prompt refining of the crude. Eligible refiners must have previously executed a Basic Sales Agreement with DOE to be eligible to buy SPR crude.

The SPR was subjected to technical tests of its drawdown capacity in February and April 1980. DOE officials said the tests, designed to determine the ability to withdraw oil from underground storage on short notice and deliver it by pipeline to a trans-shipment terminal, surpassed all goals for quantity and rates of oil movement.

PRIVATE STOCK DRAWDOWN

The appropriate role of industry stocks in offsetting a supply shortage resulting from an international supply disruption is a highly controversial issue. Until 1978, the consensus in Government and industry was that industry stocks were not sufficiently large for purposes of nationwide contingency planning. However, record high stock levels attained in 1979 and maintained through 1980 have led to a reappraisal of the role industry stocks could play. A DOE-contracted draft study estimates that current capacity for primary storage could provide approximately 200 MMB

of additional oil for use during a shortage. 1/ Primary storage generally refers to stocks held at refineries, bulk terminals, and pipelines. 2/ At the end of 1980 private stocks were, in fact, about 100 to 200 MMB above "normal" operating levels. If stocks had been drawn down in mid-July 1981 to "minimum" operating levels, as defined by the National Petroleum Council, they could have provided 232 MMB.

The Government currently has some authority to control inventory levels of oil producers, importers, refiners, distributors, and retailers, through the Emergency Petroleum Allocation Act. The authority allows DOE to require industry to build up or draw down stocks once the President finds an existing or impending regional or national supply shortage (not to prepare for one), or to meet U.S. obligations of the International Energy Program. This authority is scheduled to expire after September 30, 1981.

The Government's approach to stock management to date has been limited to collecting and distributing aggregate data. These data are not adequate to plan for and respond to an oil supply disruption. For example, the data does not allow DOE to evaluate inventory levels on a company basis. Consequently, the Department could only manage industry-wide inventory levels based on, for example, reducing stocks to a standard number of days of throughput. DOE anticipates that this method could create a great number of hardship cases and appeals.

In January 1981 DOE's Office of Energy Contingency Planning (OECP) completed a draft inventory management plan, which discusses options for drawing down private stocks during a supply disruption. The plan recognizes that DOE would have difficulty implementing key components of the plan, including collecting reliable data on a company-by-company basis, monitoring compliance, and enforcing mandatory orders. Furthermore, the plan

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1/Sabotka and Company, Inc., "Federal Subsidies to Industry to Increase Oil Stocks," Washington, D.C.: August 15, 1980.

2/The secondary distribution system also includes considerable inventories and tank capacity. Secondary stocks include those held by bulk plants, fuel oil dealers, and gasoline service stations for distribution to other suppliers or end users. Although the total storage capacity for secondary stocks is unknown, the NPC estimated in 1979 that capacity for gasoline and distillate fuel oil in the secondary and consumer segments was at least 500 MMB, or 60 percent of the primary storage capacity for these products. Shifts of sizable volumes of inventory between primary and secondary or consumer segments could occur. This suggests that the effectiveness of drawdown of primary stocks could be hampered by a buildup at the secondary level. The question deserves further study, but is beyond the scope of this report.

probably could not be implemented, according to DOE officials, for at least several months due to the need to obtain the Department's concurrence and to design and implement the appropriate information systems. Legal authority for implementing this plan also expires after September 30, 1981.

Potential levels of available stocks

In mid-July 1981 about 232 MMB of private stocks were available for use during a shortage, based on minimum operating levels identified by the NPC in 1979. This amount compares favorably to the 177 MMB in the SPR as of mid-August 1981.

How much petroleum the industry needs to maintain its operations, and how much therefore is "excess" and available for emergency use, is a controversial point. Current storage capacity within the United States at the primary level is over 1300 MMB. By far the largest part of storage capacity falls in the category of "minimum operating levels." The National Petroleum Council defines this as the level below which supplies are not available for consumer use because they are required to fill tank bottoms and pipelines and maintain normal operations. Runouts and shortages would begin if inventory fell below this level. A comparison between minimum operating levels (as defined by the NPC) and actual inventories of crude oil and those products analyzed by the NPC shows that 232 million barrels were available for emergency purposes on July 10, 1981. Total stocks were 1,299 MMB.

	NPC's Minimum Operating Inventories 1/	Actual Inventories 2/ July 10, 1981
	(millions of barrels)	
Crude oil	290	404
Gasoline	210	239
Kerosine	35	58
Distillate Fuel Oil	125	177
Residual Fuel Oil	60	74
Total	720	952

1/Some industry officials believe NPC's 1979 estimates need to be updated. Some factors, such as reduced demand for gasoline and heating oil, may tend to reduce minimum operating levels. Other factors, such as increased demand for unleaded gasoline and jet fuel and new pipeline capacity, tend to increase minimum operating levels. The NPC did not identify any seasonal stocks as part of a minimum level because, according to a company official involved in the study, seasonal stocks are available during emergencies.

2/Does not include SPR oil.

This 232 MMB is probably a conservative estimate because it does not include unfinished and other oils which totalled almost 350 MMB. It also accepts the liberal NPC definition of minimum operating levels. There is a debate about how much is really required to maintain operations, particularly that portion of minimum levels called "safety stocks." Industry considers these stocks as part of operating inventory, since they are routinely used to deal with events which would otherwise lead to shortages. The Council considers these to be "insurance" against late resupply, greater than anticipated demand, and other related potential causes of temporary shortages. It appears that while safety stocks are part of normal operating inventories, a considerable portion could be drawn down to meet emergency conditions.

The potential for using private stocks is even greater. In August 1980 stocks reached an all-time high of 1.358 billion barrels, or 290 MMB above the NPC's minimum operating inventories for the designated products.

These large inventories in 1980 and 1981 are, at least in part, the result of an unusual set of circumstances including the oil market disorder accompanying the Iranian revolution in 1978 and 1979, the resulting large stock buildup, and the unexpectedly sharp drop in U.S. demand in 1980 and 1981. Although the current conflict in the Middle East may be a continuing incentive for companies to maintain high stocks, a return to a more stable world oil market and/or U.S. economic recovery might result in a drawdown to a more normal range of 1100 to 1200 MMB. Should a U.S. import shortfall then occur, the U.S. might have little surplus stock available to draw down, as was the case when the Iranian shortfall occurred in 1978 and 1979.

Legal authority

DOE believes it has adequate legal authority to require private stock drawdowns during a supply disruption. However, this authority is scheduled to expire after September 30, 1981.

Section 15 of the EPAA gives the President authority to require adjustments in the crude oil and product inventories of producers, refiners, and sellers if he finds an existing or impending regional or national supply shortage. This authority may be used to increase or decrease the volume of crude oil or product in inventory, although a firm cannot be required to accumulate more than a ninety-day supply or to make physical additions to storage facilities. The President has delegated this authority to DOE.

In addition, Section 16 of the EPAA (the anti-hoarding provision) provides that during a severe energy supply interruption a firm cannot willfully accumulate crude oil, residual fuel oil, or any refined product in excess of that firm's reasonable needs.

An indirect form of inventory management authorized by Section 14 of the EPAA gives the President authority to order adjustments in refining operations, so as to require, for example, that two or more refined products be produced in a specified ratio.

Recent role stocks have played

On a national and international level, a prudent stock management policy calls for building stocks during normal times and drawing them down during a shortage. However, industry cannot be counted on to follow such a policy. In fact, prudent business behavior and protection of the consumer might suggest the opposite behavior during disruptions because they engender confusion and uncertainty. Furthermore, a profit maximization course for any individual company might also suggest conserving stocks during a disruption. Although companies have generally maintained large stocks since 1980, an unusual set of circumstances was responsible for this buildup. Industry officials with whom we spoke differed on whether they thought these large inventories will remain a lasting feature of the industry.

While inventory accumulations may not have caused recent oil shortages, they probably made them worse. This is apparent in the two major oil disruptions of the seventies, caused by the 1973-74 oil embargo and the 1979 Iranian revolution. Both shortages followed previously low inventories, high petroleum demand growth, and a sharp drop in crude oil production. However, world-wide oil inventories actually increased both during and after each disruption.

For example, in the fall of 1973, world oil inventories were considered to be low. According to statistics from the British Petroleum Statistical Review of the World, in 1970 and 1971 average annual accumulations had been 1.64 and 1.55 MMBD respectively; in 1972 they were only 0.8 MMBD. At the same time, the worldwide demand for oil had been growing at an annual rate of 7 percent. Then, within one month of the October 1973 declaration of the oil embargo, OPEC's production rate dropped from 33 to 29 MMBD, about 12 percent. Nonetheless, during and after the shortfall, stocks increased. Oil stocks grew by 1.5 MMBD in 1973 and 2.3 MMBD in 1974.

The situation in 1978-79 was remarkably similar. A soft oil market in 1978, with low prices and low profit margins, provided an economic incentive to keep stocks as low as possible. In fact, inventories were drawn down slightly in 1978 and oil consumption was rising at an annual rate of about 4 percent.

Then, as a result of the Iranian Revolution, Iran's production fell from over 6 MMBD in September 1978 to 400 MBD in January 1979. Average loss of total OPEC crude oil production was around 3 MMBD, about 11 percent, since other countries increased production. At the same time, with higher oil prices, consumption was actually declining by the end of 1979. Still, as during the

earlier embargo, stocks increased during and immediately after the shortfall. Although stocks initially decreased in the first quarter of the year, in total they grew by 1.6 MMBD, and reached record levels.

Given the demand growth and relatively low stock levels which preceded both disruptions, it is reasonable to suggest that the accumulations were part of normal market trends. Any businessman faced with uncertainty about supplies of such a vital commodity as oil is likely to favor a conservative inventory policy. On the other hand, higher prices and declining demand in the months following a shortage lowers demand. This suggests that at least part of the stock accumulations were probably unnecessary.

The debate on the role that inventories played is reflected in two separate analyses, performed by DOE and the Justice Department, of the role of inventories in the 1979 gasoline shortage. DOE found that inventory management along with import levels were primarily responsible for the gasoline supply shortage in the spring and summer of 1979. DOE concluded that refiners could have made more gasoline available from May to July of 1979 without reducing stocks below minimum operating levels. DOE attributed refiners' conservative stock management practices to the disruption in international crude oil markets and resulting uncertainty regarding crude oil supply.

On the other hand, Justice concluded that combined crude and gasoline stock behavior played no significant role in the gasoline shortage. Justice found that refiners' inventory management of crude oil accounted for only 5 percent of the total gasoline shortfall over the first three quarters of 1979. Management of gasoline stocks, it found, helped lessen the impact of the shortage over the same period, although it probably could have helped even more.

The diverse conclusions reached by the two agencies can be attributed, in part, to contrasting methodologies and the difficulty in defining "normal" inventory levels. DOE concluded that 1979 inventories of crude oil and gasoline, in comparison to 1977 and 1978 levels, were excessive. Justice compared 1979 inventories to an October 1978 forecast of the Independent Petroleum Association of America, which Justice considered an accurate indicator of industry expectations of supply levels had the shortage not occurred. Using this methodology, Justice found that crude oil stocks during the first half of 1979 increased by only 2.95 percent more than the Petroleum Association's predictions. Considering the uncertain market conditions, Justice concluded

this level was consistent with "prudent business behavior during a crisis." 1/

Without a doubt, the oil market was in deficit for the first quarter of 1979. In the following months this was not true. The fact that stocks increased during a shortage does not, of course, prove that the market was manipulated or even mismanaged. With the advantage of hindsight, however, it is possible to argue that the shortage in the United States could have been reduced if inventories had been better managed. This improved management, for example, would have meant less drawdown in 1978 and less accumulation in 1979.

1979 was a watershed year in the changing world oil market. The Iranian shortfall and other actions by producer nations resulted in a doubling of crude oil prices. Long-term contracts were cancelled by producer nations with little or no advance warning. Short-term and spot deals proliferated. In this atmosphere of protracted insecurity, oil inventories, which had been below normal in most oil importing countries at the start of the crisis, rose to record-high levels by the third quarter of 1979. Stocks remained at or above that level through the third quarter of 1980 despite an estimated 2.5 MMBD crude oil surplus on the world oil market and a declining demand for oil products in the industrialized world. The war between Iraq and Iran in the fall of 1980, and the resulting cutback in their oil exports and anxiety over the security of all exports from the Persian Gulf, perpetuated generally high stock levels through the end of 1980.

The underlying causes for this apparent change in oil industry stock policies are complex. They include the loss of flexible offtake levels from producer countries, the declining role of the major oil companies as secure sources of supply for independent and small refiners, and the proliferation of short-term supply relationships, all of which encouraged oil companies to hold larger inventories than before. Whether or not these large inventories remain a lasting feature of the international oil market, they have demonstrated that industry has the capacity, and sometimes the will, to maintain stocks above traditional levels.

Past Federal involvement in stock management

Until recently, the Federal approach to industry-held stocks of crude oil and its products was limited to collecting and distributing aggregate data, much of it limited in scope. DOE considered stock buildup and drawdown decisions the prerogatives

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1/For more information, see U.S. Department of Energy, "Final Report to the President on Oil Supply Shortages During 1979," July 1980, and U.S. Department of Justice, Antitrust Division, "Report of the Department of Justice to the President Concerning the Gasoline Shortage of 1979," July 1, 1980.

of individual companies, and generally did not challenge them. It believed that Government interference with internal business operations should be minimized and recognized that DOE, in any case, did not possess sufficiently comprehensive, reliable, and timely data or the programs to effectively manage inventories.

Federal reluctance to get involved in industry stock management was also based on two major assumptions--that stocks are kept at minimum levels and therefore generally not available for emergency drawdowns, and that the SPR would be filled in a timely manner. These assumptions were reflected in the SPR Plan submitted to and approved by Congress in early 1977.

By mid-1979, however, these assumptions became less valid. Inventories did, in fact, rise above traditional operating levels without Government incentives and the SPR was far behind schedule--containing only about 93 MMB of oil. Additionally, reports of hoarding and the general inventory buildup during and after the 1973-74 and 1979 shortages sensitized Congress to the potential significance of stocks during an oil shortage. By late 1979 a DOE task force had concluded that developing a U.S. government capability to manage industry stocks would be more cost effective than acquiring, say, an additional 100 MMB for the SPR. Moreover, given the current international sensibilities about the United States stockpiling oil, including producer country opposition, a less visible policy of encouraging private stockpiling was considered prudent. DOE is now reconsidering its options for monitoring and influencing inventory levels, particularly for encouraging drawdowns during a supply disruption.

The Federal Government reconsiders its role

In late 1979, as the assumptions on which Federal reluctance to get involved in private stock management were changing, the Security Coordinating Committee of the National Security Council convened a working group on contingency planning. The group observed that industry cannot be relied upon to draw down primary stocks during an oil supply shortage, but is more likely to try to increase stocks because of overly pessimistic projections of future supplies. They suggested that Government control of stockbuilding might help reduce demand and price pressures generated during supply disruptions. However, the group also questioned the feasibility of controlling private stockbuilding due to problems in determining desirable levels, enforcing inventory limits, and achieving the necessary international cooperation.

An interagency working group headed by DOE was assigned to develop a plan to manage primary stocks. Among its conclusions the group reported the following in March 1980:

- There are substantial amounts of private stocks normally required for operations but available during contingencies to reduce supply and distribution problems.

- If greater drawdown of private stocks is in the national interest, industry should not be expected to initiate such reductions without Federal intervention or guidance.

- International coordination of drawdown of emergency reserves can best be provided at the Federal level.

- Federal surveillance over private stocks during supply contingencies should be a viable component of the Department's crisis management options.

- There are serious implementation problems such as potential Federal delays, routine safeguards required to prevent excessive Federal intervention, and development of appropriate criteria for increased Federal controls.

- Federal management and control of secondary and tertiary stocks (excluding utilities) is impractical.

As discussed below, by January 1981 DOE had drafted several possible options for drawing down inventories during a supply disruption, and said it was developing a more comprehensive data base to monitor crude and product inventories on a company-by-company basis.

Current planning

DOE's authority to manage private stocks by requiring inventory adjustments has never been formally used and is currently not considered practical. If a supply disruption were to occur now, DOE would be ill-prepared to set valid inventory levels. It is only now developing plans and procedures for establishing target levels, and does not have the data or enforcement resources to require adjustments on a company-by-company basis. The best it could do is establish a uniform ratio or percentage stock drawdown applicable on an industry-wide basis. But company situations vary. Because this kind of action would not tailor reductions to specific companies, DOE believes it could create a great number of hardship cases and appeals.

A draft study prepared for DOE 1/ identified several reasons why the President's authority to require adjustments in the crude oil and product inventories of producers cannot be currently implemented.

--EPAA authority could not be used to require firms to maintain high stock levels in anticipation of future

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1/Sobotka and Company, Inc., "Potential for DOE Control of Private Petroleum Levels Using the Existing EPAA Authority," Washington, D.C.: September 3, 1980.

disruptions unless the President finds "an existing or impending regional or national supply shortage." By this time, however, the market is already tight and incremental supplies are not available to be stored in inventory.

--DOE lacks sufficient data and analytical expertise to adjust inventories on a company-by-company basis since:

- Much current data is reported on a custody rather than an ownership basis.
- Aggregate definitions of "normal" and "minimum" inventory levels cannot be applied to individual firms since each has unique supply and operating conditions affecting inventory behavior.
- DOE lacks staff experts on the inventory conditions of oil companies.

--DOE is unable to verify and enforce compliance with EPAA-authorized regulations to a class of inventory-holders. If, for example, DOE were to require all refiners to reduce their stocks during a shortage to a level no higher than 95 percent of their average level for that month:

- Verification would be limited to ex post facto audits of a firm's accounting system.
- Failure to comply would be punishable by a fine of between $10,000 and $40,000, or one year in jail for willful violations. The difficulty of proving a willful violation makes it unlikely that a firm will be deterred by a fine which pales beside the enormous inventory profits that can be made during disruptions.
- A general application of the regulations to all firms or a category of firms is likely to result in significant inequities and inflexibilities. Firms which had large recent growth in petroleum throughput or a change in their supply system may encounter serious logistics problems in meeting a standard stock level because of increases in their minimum operating inventory level.

OECP's proposed inventory management plan

In January 1981 DOE's Office of Energy Contingency Planning issued a draft plan with options DOE could use to monitor and influence the management of private oil inventories during a supply interruption. Specifically, the draft plan discusses ways

to draw down excess primary stocks during an emergency to avoid or reduce physical shortages. It also says the Department will develop detailed historical, current, and projected national and company profiles of capacity, refinery utilization, stocks, crude and product supply, and sales obligations. Depending on the nature and size of the disruption, the amount of data and resources available, and DOE's assessment of the situation, one of four responses could be taken. Each option calls for a voluntary program, followed by mandatory orders if necessary.

Option 1. DOE, with industry, to establish a national stock drawdown target and determine stock reductions needed on a company-by-company basis to reach the target. Projections of shortages would be confined to the coming 2 or 3 months.

Option 2. DOE to establish minimal volumes of product needed to avoid widespread disruption. DOE to analyze each firm's product inventory, along with other aspects of its refinery operations, and determine maximum feasible stock reduction by that firm. This option would include supply projections for the following year and focuses on regional supply problems.

Option 3. Same as preceding options except that instead of requesting or assigning specific stock reductions, each firm is requested or required to manage its inventory in a manner to supply a specified volume of product to the marketplace.

Option 4. Same as Option 1 except that, instead of establishing individual fractions based on a firm's unique situation, a uniform national fraction for all firms would be established. This option takes less time than the other options to reach the mandatory phase. However, because it does not tailor the orders on company-specific data, OECP would anticipate a great many appeals from the orders.

Limitations of the proposed plan

DOE's proposed inventory management plan is a good first step. However, the plan is not yet operational. It still requires coordination with other parts of DOE and approval by the Secretary. Also, new information systems must be developed, and approved by the Office of Management and Budget. This, in itself, could take several months. One DOE official estimated that once decisions on the plan's approach and methodology are finalized, about 3 months would be required before the plan is operational.

The proposed plan recognizes several limitations. These include, among others, difficulties

--in collecting reliable

. historical company-specific equity data,

. company-specific projected supply forecasts, and

. company-specific product inventories and product supply forecasts.

--in monitoring compliance and in enforcement, due to the lack of reliable data and the scheduled expiration of the EPAA which provides the basis for mandatory orders and enforcement.

Currently, some effort is being devoted to designing the necessary systems as if the proposed plan were already approved. Some of the data systems are being developed to collect information on a regular monthly or weekly basis, others to be implemented during a supply disruption only.

However, according to a DOE official, the effort is being complicated by DOE's broader attempt to develop an integrated information system for oil supply balances. This system is being designed to replace scores of antiquated DOE systems, many of which are unrelated to contingency planning. Until that effort is completed, it is difficult to determine what additional data will be needed for stock management purposes. It could well be several months before the systems are designed and approved by the Office of Management and Budget.

Many additional questions on how the plan would be implemented remain. For example, different staffing requirements and organization are needed to implement the various response options; DOE's estimates range from 11 to 41 people, not including those handling appeals and auditing. Some DOE officials would like to see a small core group permanently assigned to monitoring inventories. Where the additional staff needed during a supply disruption would come from remains to be seen.

Another problem the draft plan does not address is how to achieve international coordination of stock drawdown. Such coordination is vital to the ultimate success of any stock management plan. It is an area that provides benefits for all importers. Without it, stock reductions in one country, which would normally alleviate demand and price pressures on the international market, could be offset by stock accumulations in another country.

Conclusions

Private oil stocks can play an important role during an oil import disruption. A wise stock management policy calls for stocks to be built up during normal business times and drawn down during a shortfall. However, industry alone cannot be counted on to follow such a course. Prudent business behavior and overly pessimistic supply projections suggest just the opposite.

DOE has drafted an inventory management plan outlining options for the Government to influence private stock levels during an energy emergency. It is a good first step. However, it will probably be at least several months before the plan is operable. Much remains undone, particularly in designing and getting OMB approval for the required data systems. Even with the best data, however, it will be difficult to predict, with a high degree of confidence, the expected length and size of a supply interruption, and to reach a consensus with individual companies on supply and demand projections. Where the staff required during an emergency will come from and how compliance will be monitored have not been resolved. Another major unresolved item is how to achieve international coordination of stock drawdowns.

Finally, enforcement of any of the options would be impossible after the EPAA expires after September 30, 1981. Obtaining the kind of standby authority that DOE would need to implement a stock drawdown, however, has its disadvantages. Industry officials with whom we spoke, the National Petroleum Council, and the American Petroleum Institute, firmly believe that such standby authority, like mandatory allocation authority, is a big disincentive for industry to maintain any stocks above minimum operating levels. Companies believe they should not bear the costs of obtaining and holding additional oil if the possibility exists that they will not have control over, and realize the full profit potential from, those supplies, particularly if they are allocated to other companies.

We agree that drawdown authority may be a disincentive to holding large inventories. Nonetheless, we believe the Government should maintain that authority. With timely, comprehensive, and reliable data systems in place, we believe the Government is in the best position to protect the national interest and determine national inventory levels during an energy emergency. We also believe that private industry holding of large inventories above operating requirements is in the national interest and companies should not be discouraged from doing so. We identify several alternatives in Chapter IX to offset the disincentive cited above and to encourage larger holdings of private oil stocks.

CHAPTER IV

SUBSTITUTING FOR OIL

There are two major ways in which the United States can effectively adjust to an oil disruption without necessarily having to cut energy consumption. First, it can increase supplies directly by temporarily increasing existing oil production or drawing down public and private oil stocks as discussed in the preceding chapter. Second, it can substitute alternate fuels, such as natural gas, coal, nuclear power, or high sulfur residual fuel for oil in those facilities which have the capability to use them. The oil displaced from those facilities which can burn alternative fuels will be available to facilities whose oil has been cut off but are unable to switch to other fuels. Also, electricity produced by non-oil-fired generating units can be increased and transferred to areas where electricity is normally generated by oil. These actions free up oil without necessarily reducing overall energy consumption or industrial and utility output.

DOE estimates that the maximum potential for substitution in the near term is between 759 and 904 MBD, depending on the type and number of measures pursued. Unfortunately, much of this potential could not be achieved if a supply disruption were to occur now. DOE has drafted contingency plans, which are in varying states of readiness. Most measures face legal, regulatory, financial and/or logistical constraints, and DOE has not yet designed ways to overcome them.

OIL-TO-GAS SWITCHING

Among the substitution programs, oil-to-gas switching seems to be the most promising. While estimates of possible oil offsets vary widely, the consensus is that the potential is significant. The measures described in DOE's June, 1981 draft plan could, if operational, displace from 290 to 435 MBD over a twelve month period. Other groups have produced more optimistic figures, ranging between 0.8 and 1.2 MMBD.

However, all these figures are highly speculative. A careful assessment of all the variables affecting oil-to-gas switching has not been performed. DOE estimates take transportation bottlenecks and investment requirements into account. The Department is concerned that the pipeline system may not be capable of moving large volumes of gas to certain regions particularly if a crisis occurs during the winter heating season. DOE also believes that to achieve savings greater than 435 MBD would require large capital investments in gas burning equipment, gas hookups and supplemental distribution lines. Thus, financing may present problems. The fuel switching potential would also be contingent on availability of additional gas.

DOE presently has authority to promote oil-to-gas switching during an oil supply emergency indirectly by prohibiting oil

use in accordance with the Powerplant and Industrial Fuel Use Act (FUA). While those firms whose oil was cut off and had gas burning capability would switch voluntarily, this authority would be used to ensure that facilities which can burn gas but are not short of oil would switch. This would minimize disruptions to production of other firms which have no alternative fuel burning capability.

DOE's Emergency Oil-to-Gas Switching Program

DOE's oil-to-gas switching draft plan has adequately addressed many issues relevant to contingency planning. Some measures identified in the plan can be considered nearly standby. But the two measures with the greatest saving potential are not developed to a point where they could be quickly implemented.

The plan identifies voluntary and mandatory measures which could be taken in response to a disruption. Voluntary actions, which could total up to about 107 MBD of fuel oil equivalent include

--processing applications for exemptions to the Powerplant and Industrial Fuel Use Act allowing powerplants to burn natural gas;

--authorizing natural gas to displace oil through the ERA/FERC certification program;

--asking state regulatory agencies to lift gas use restrictions; and

--requesting electric utilities, large industries and Federal facilities to switch to gas temporarily.

Mandatory measures which could displace between 183 and 328 MBD over 12 months are

--using existing statutory authority to prohibit using oil as a primary energy source in utility and industrial facilities capable of using natural gas;

--using the authorities provided by the Emergency Petroleum Allocation Act to allocate refined petroleum products;

--seeking new legislation to regulate the production, distribution, sale, and use of natural gas as required during an emergency; and

--exploring the feasibility of using the Defense Production Act to allocate natural gas.

Some of these actions do not save oil directly but are helpful in implementing the oil-to-gas switching program.

While the first two actions outlined above would only save 3 MBD, they are important because they permit the other voluntary actions which displace fuel oil.

The exemption program, administered by the Energy Regulatory Administration (ERA), provides temporary public interest exemptions from the provisions of Section 301 (a), 2, 3, of FUA, which restrict the use of natural gas as a primary energy source in existing electric powerplants. The exemptions are granted to qualifying candidates for a certain number of years. While this is not an emergency program, DOE believes that it can be useful to counter an oil disruption. In the event of a crisis, DOE could speed up the exemption process for qualified applicants and extend the exemptions that expire. The FUA exemption program is currently under revision to ease the existing regulatory procedures on gas use.

The Certification program, administered jointly by the ERA and the Federal Energy Regulatory Commission (FERC), has been useful in speeding up the process that end users would normally go through in purchasing additional natural gas supplies to displace fuel oil. Normally, FERC must approve the transportation of natural gas through interstate pipeline. Under usual FERC procedures the authorization would take 3 to 6 months. The ERA's program which certifies eligible users to purchase natural gas is designed to reduce the time to about one month. DOE officials say that during an emergency the usual one month certification period can be further shortened by waiving notice periods and expediting concurrence procedures.

ERA's program is implemented together with the FERC Order 30 Program, which satisfies the requirements of the Natural Gas Act. FERC's program, which was scheduled to expire May 31, 1981, was extended indefinitely. The FERC is currently considering a proposal to provide blanket certification for the transportation of natural gas used to displace fuel oil. If this proposal is accepted there will be no need for ERA's certification program.

According to DOE, new legislation to regulate the production, transportation, distribution, sale and use of natural gas during emergencies may be required. While existing FERC programs are useful in implementing an oil-to-gas switching program, the available programs and authorities generally deal with emergencies resulting from natural gas shortages. DOE and FERC are examining existing regulations and the need for legislation to effectively implement an emergency oil-to-gas switching program. The EPAA can be used to deny fuel oil to facilities which have alternate fuel burning capabilities to ensure availability to other users. However, EPAA expires at the end of September 1981.

DOE is also examining the extent to which the Defense Production Act can be used to allocate natural gas and oil to end users during an oil shortage.

Detailed implementation plans are available for all but the last two measures listed earlier. The implementation plans outline the sequence of response actions, implementation schedules, office responsibilities, staffing needs, and information requirements. Other issues, such as timing, relevant regulations, and compliance mechanisms are also addressed. Legal authorities and constraints to switching are identified but not adequately discussed.

The last two measures outlined earlier could provide the largest savings but are not developed to the point that they can be used effectively during a crisis. According to DOE, these actions would help to save between 93 and 238 MBD. These measures are discussed only generally in the draft plan and no specific implementation actions are outlined. It appears that the coordination required between DOE officials and Congress to identify and pursue the authorities required in the area of oil-to-gas switching has not taken place. Unless action is taken prior to the onset of a crisis, it is unlikely that this particular set of measures can accomplish the anticipated savings in a timely fashion.

Oil displacement potential

As noted earlier, DOE's Office of Energy Contingency Planning estimates the potential for oil-to-gas switching to range from 290 to 435 MBD. Fifty MBD could be saved in 3 months, between 100 and 200 MBD six months after the onset of a crisis and the remainder after 12 months. The Department estimates that additional gas supplies are available to satisfy switching requirements. However, the savings, lead times and gas supply estimates presented in DOE's draft contingency plans are highly speculative.

The wide range in oil saving estimates reflects uncertainties about the number of companies which have alternative fuel burning capability and constraints on the ability of the existing pipeline and transmission system to move more gas. The estimate of the maximum potential for savings is particularly speculative due to data deficiencies. To calculate the potential for alternate fuel use and identify candidate companies and Federal facilities for fuel switching, DOE used data collected by the Environmental Protection Agency and the Energy Information Administration which needs to be updated and refined. There are also data gaps in the areas of surge gas production possibilities and deliverability of additional gas supplies.

DOE's Office of Policy and Evaluation produced estimates that are higher than those calculated by the Office of Energy Contingency Planning. 1/ The Policy and Evaluation office calculated that gas could displace as much as 0.8 to 1.2 MMBD during a small to medium oil supply interruption.

1/Department of Energy, Reducing U.S. Vulnerability, Energy Policy for the 1980's, November 10, 1980.

Other groups have also produced more optimistic fuel savings estimates. The American Gas Association (AGA) asserts that the gas switching potential over a year could be on the order of 1.1 MMBD. The Gas Research Institute endorses the AGA figures. The NPC estimate, 510 MBD, comes close to the contingency planning figure, but the lead time for achieving the savings differs considerably. The NPC calculates that 210 MBD could be saved in one month and the entire 510 MBD within 6 months of the start of the disruption.

The wide variation in these estimates stems largely from different assumptions about factors influencing the implementation of an oil-to-gas switching program and on differences in data sources. An oil-to-gas switching strategy is contingent upon the end user capability to burn the gas, secure gas supplies, and the capacity to transport and deliver the fuel. Gas availability and transport capacity are influenced by market circumstances and seasonal factors such as prices, regulations, and weather conditions.

The large differences in views suggest that the information base for contingency planning in this area is unsatisfactory and must be improved.

Gas supply availability

Gas supply and deliverability issues are discussed in general terms in DOE's oil-to-gas switching contingency draft plan. DOE recognizes that full implementation of the oil-to-gas switching program will depend on the availability of adequate supplies when an oil disruption occurs. However, the plan does not delineate specific actions that can be taken prior to or during an emergency to increase production from existing gas wells or tap and deliver surplus gas that might be available. The plan analyzes gas supply availability for one scenario--an oil disruption beginning in January 1981 and lasting for 6 months. DOE concluded that gas supplies could satisfy switching requirements estimated at 435 MBD under this scenario. The plan states that "risks to normal natural gas supply and delivery obligations would be minimal from January through October 1981." But it noted that pipeline capacity might be a constraint if very large volumes of gas are needed during the winter season. There is no discussion of the gas supply outlook for future years or any strategy to secure additional gas for future emergencies. The draft states that because gas availability is subject to seasonal changes, the figures would be updated periodically.

According to DOE, most of the gas could be obtained domestically. Opportunities for increasing natural gas imports are limited in the near term. DOE's estimates on supply availability for January to June 1981 are shown in the following table.

TABLE 1

DOE'S ESTIMATE OF POTENTIAL
SUPPLIES FOR OIL-TO-GAS SWITCHING

Source of Gas	Available Supplies (MBDOE)
Domestic	
Intrastate surplus gas	198
Interstate surplus gas	67
Surge production	100
Subtotal	365
Imports	
Increased Canadian imports now authorized by the U.S.	116
Increased authorizations to import Canadian gas	33
Subtotal	149
Grand Total	514

The Department has acknowledged that this potential supply may be constrained by deliverability problems, especially during the winter. While some gas fields and wells have excess productive capacity, there are limitations on gathering lines and pipeline compressors. Also, there might be pipeline capacity problems in certain regions such as New England, where pipelines normally operate at their maximum during the winter. Taking potential deliverability problems into account, DOE estimates surplus gas availability during the next winter at 350 MBDOE. This suggests that the maximum oil-to-gas switching potential identified earlier (435 MBD) could not be realized. However, these numbers are very speculative since DOE has not performed a thorough assessment of gas supplies.

Time is a crucial element in an analysis of gas supply availability. For example, the ability to secure and deliver additional gas depends on the time required to prepare existing fields for surge production and the season during which an import disruption takes place. These factors are incorported more explicitly in the NPC's study of oil-to-gas switching. The Council estimates surge gas supply for this year between 350 and 600 MBD, depending on the season. The lower estimate refers to the potential during the winter season and includes gas supplies in underground storage generally unused. The upper limit, which exceeds both OECP's and NPC's estimates of present switching capability, includes gas likely to be available during the summer. According to the NPC, determining precise potential for increasing gas production capacity would require a detailed study of reserves and production levels. The study also concludes that while available evidence

suggests that gas surge production does not exceed spare pipeline capacity, it is not possible to rule out transportation problems, particularly during the winter. The study suggests that a careful assessment of end user switching capacity, geographical areas where surge production exists and natural gas pipeline capacity would be required to determine if transportation problems limit oil-to-gas switching potential. According to DOE, various groups have been examining some of these areas but no studies have yet been completed.

The Federal government can order increased gas production from certain fields. EPCA authorizes the President to order production from fields on Federal lands designated by him at the maximum efficient rate of production (MER) and, during a severe energy supply disruption, at the temporary emergency production rate (TEPR). The President may also require the production of fields in any State at the MER or TEPR established by the State. However, current information is not adequate to determine the maximum additional gas production that could be obtained during an emergency.

Increasing natural gas imports

Natural gas imports could possibly be increased during an oil supply disruption, but several constraints exist to importing large volumes and DOE has not prepared a plan for securing additional imports. Increasing imports from Canada may be possible, but prospects for Mexican gas are not very promising, at least in the short term.

Additional Canadian gas could be obtained by increasing purchases of Canadian gas already authorized by DOE, and further by importing the maximum level not yet authorized by DOE but authorized by the Canadian government. U.S. pipeline companies were not purchasing the maximum U.S. authorized import levels between January and June 1981. DOE's draft plan indicates that companies were taking only 78 percent of the volumes they were entitled to during that period. 1/ DOE estimated that an additional 116 MBD of fuel oil equivalent was available if the total U.S. authorized imports were acquired. Also, the Canadian National Energy Board has authorized natural gas export volumes in excess of what the U.S. Government has allowed domestic companies to purchase. An additional 33 MBD of oil equivalent could be delivered if U.S. companies imported the maximum authorized by the Canadian Government. Therefore, within the existing U.S./Canadian trade framework, 149 MBD (oil equivalent) of gas not being imported is possibly available for emergency use.

1/For more information on Canadian import volumes, see U.S. General Accounting Office, "Implications of the U.S. - Algerian Liquefied Natural Gas Price Dispute and LNG Imports," EMD-81-34, Dec. 16, 1980, Appendix I.

Imports from Mexico could not be increased substantially in the immediate future. U.S. companies are currently purchasing the maximum level of imports authorized by the U.S. and Mexican governments, which is 300 million cubic feet per day (52 MBD of oil equivalent). Presently, the existing pipeline capacity is nearly fully utilized. According to the American Gas Association, the capacity of the existing gas transportation system to deliver Mexican gas is limited to an additional 50 MBD of oil equivalent. While Mexico may be willing to export more in the future, new pipeline and transmission facilities would have to be built, particularly to import large volumes for offsetting a shortfall.

Another source of additional gas imports often mentioned is Algerian liquefied natural gas. While the LNG surge export potential from Algeria is significant, it cannot be considered reliable. As a member of the Organization of Arab Petroleum Exporting Countries (OAPEC), Algeria may cut off gas exports if the disruption stems from an OAPEC oil embargo. In any case, facilities at Cove Point, Maryland, and Savannah, Georgia, could receive only 365 billion cubic feet a year or about 170 MBD of oil equivalent. Moreover, the contract between the El Paso Natural Gas Company and Algeria has been suspended, and no gas has been received due to the recent U.S. - Algerian price dispute.

Summary on gas supplies

An assessment of gas availability is an important aspect of an oil-to-gas switching plan. DOE has not adequately identified potential supplies of gas for emergencies. The NPC has done the only study which addresses surge gas potential. The study indicates that although detailed analyses of reserves and production capabilities are not yet available, gas supplies in the near term could displace between 400 and 600 MBD, depending on the time of the year. Most of the gas could be obtained from domestic sources. Prospects for additional gas imports are uncertain. According to DOE and the NPC, gas supplies can be considered adequate for meeting gas switching requirements which do not exceed 500 MBD. However, gas availability could be a problem if a disruption takes place during a severe winter and the gas pipeline system is operating at full capacity.

The existing oil-to-gas switching information base is inadequate

A reliable data base is a crucial element in effective contingency planning. Because information gathering activities are inherently time consuming, the necessary data must be acquired, updated and retrieved easily in the event of an emergency.

In the case of oil-to-gas switching measures, DOE has identified a number of data sources and specific information on various aspects of natural gas supply and use which are currently available for designing and implementing action in this area. However, there are still some information gaps and unresolved issues concerning gas use and deliverability. As noted earlier,

oil savings estimates are highly speculative because of incomplete data on end users' fuel switching capability. Some of the existing information is dispersed among various Government agencies and private sector groups and it is not clear whether it is in a suitable format and easily accessible for use when needed. Moreover, a key element of DOE's planning in this area has recently been eliminated. The Department had begun a survey of industrial fuel use capabilities but the program was eliminated by the Office of Management and Budget. The planned followup work on the commercial, defense, institutional and other government sectors has also been cancelled.

The potential surge capacity of interstate gas pipelines has not been clearly established. Several groups including DOE and the FERC are now examining this question. The timely completion of these studies is crucial for designing a sound oil-to-gas switching program.

According to DOE, existing information on gas reserves and production capacities is not reliable and cannot be counted on for contingency purposes. In particular, estimates of the maximum efficient rate of production (MER) and temporary emergency rate (TEPR) of gas fields have not been clearly established. In some cases, MER's were estimated as long ago as 1923 and have never been revised. The MER is the maximum rate of production which can be sustained in a reservoir without loss of ultimate recovery from natural gas reserves. The TEPR is the rate of production above the maximum efficient rate which may be maintained for a period of less than 90 days without reservoir damage and without significant loss of ultimate recovery of natural gas.

Information on production rates is needed to design specific contingency plans for obtaining surge natural gas production during emergencies. In an effort to acquire better information DOE asked the National Academy of Engineering and the Energy Information Administration to study gas reserves and production capacity. The State governments were also asked to update the MERs and TEPRs for their natural gas fields. Obtaining the information will take some time. While DOE and the NPC estimate gas supplies to be adequate in the near term to displace a maximum of 435 MBD, more information will be needed to plan a long term strategy based on greater gas use for disruptions in the future.

In summary, additional information is needed to determine more precisely surge production, the capability of pipelines to deliver additional gas, and the prospects for using gas to displace oil by end users.

Conclusions

Being able to switch quickly during an emergency depends on having additional gas use capabilities, excess gas supplies and the adequate capacity to transport and deliver more gas. Associated with these factors are a number of legal, regulatory and investment considerations. To be effective, any plan to use

gas in place of oil during an emergency must be explicitly designed to account for all of these factors. Failure to do this undermines the standby basis of an oil-to-gas switching program.

Estimates of oil-to-gas switching are highly speculative. A better assessment of gas deliverability and end user gas use capability is required. One important aspect of this program is reliable data. DOE needs to keep the required information current and ready for contingency use.

DOE's plan outlines a course of action which addresses some impediments to increased gas use. However, the plan does not contain any specific measures to handle potential gas supply and financial constraints, despite recognizing that these are important. To the extent that it does not address these constraints, the likely effectiveness of DOE's plan in achieving the maximum oil savings is in question. Some ideas for dealing with the constraints are discussed in Chapter X.

OIL-TO-COAL SWITCHING

Pursuant to the Powerplant and Industrial Fuel Use Act of 1978 (FUA), DOE designed a program to encourage permanent conversions from oil to coal. This program has been slow in achieving its goals because of environmental, financial, and regulatory constraints to coal conversions. According to DOE, there are various plans in progress to gradually convert as many plants as possible from oil to coal and these plans are for permanent conversions. These plans are part of the long run policy of reducing dependency on oil imports and maximizing use of domestic energy resources. With each permanent conversion, the number of plants which could convert in an emergency is reduced.

However, U.S. vulnerability to oil shortages has drawn more attention to coal conversion as a potential option for dealing with oil supply disruptions. Our definition of oil-to-coal switching includes accelerating coal conversions in response to a disruption and encouraging temporary substitution of coal for oil.

Many power plants originally designed to burn coal were converted to oil during the 1960's because of environmental regulation. 1/ In theory, coal-capable power plants which are now burning oil could switch back during a disruption. However, logistical constraints could delay switching, even if environmental rules were relaxed. Since the plants have not burned coal

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1/Some utilities also acquired gas burning capability. Generally, gas has been used as a secondary fuel. More recently, though, some companies have been burning gas exclusively because of the gas surplus, the cost of oil, and environmental constraints on coal burning. These companies have been able to obtain exemptions to current gas use restrictions.

for many years, switching could require repairs to the coal combustion, storage, and handling equipment or additional equipment to replace that which is no longer serviceable. The number of plants which could switch easily in a disruption has not been adequately assessed. DOE's June 1981 draft on emergency coal-switching contains measures which could potentially displace as much as 213 MBD by the end of 12 months. However, much more planning and major modifications of existing laws and environmental regulations are required before this program can be counted on for contingency purposes. While DOE has identified several environmental, legal, financial, and logistical constraints to timely coal conversions, it has not proposed adequate measures to remove them.

DOE's coal-switching program

DOE's draft emergency coal-switching plan outlines existing mechanisms and procedures which could be employed to pursue oil-to-coal conversions, lists the laws that must be changed in order to maximize coal conversion, briefly discusses general contraints to conversion, and identifies a number of possible emergency response measures.

The plan specifically identified three provisions of the Clean Air Act which would facilitate the coal-switching process during an emergency: (1) Section 110 can be used to relax some of the requirements of State Implementation Plans adopted under the Clean Air Act. However, these State Implementation Plan revisions must insure that national primary and secondary ambient air quality standards are attained and maintained. (2) Section 113-d-5, which authorizes EPA to issue a Delayed Compliance Order (DCO) upon request of a plant's operators, allows a plant prohibited from burning oil or gas to use coal temporarily without having to comply with an applicable Clean Air Act State Implementation Plan while installing pollution control equipment. (3) Section 110(f) authorizes the State governors to temporarily suspend their State Implementation Plans. The 110(f) waiver is valid for only four months.

The draft plan contains four sets of measures to be implemented according to the severity of the oil supply disruption. All of them basically address environmental impediments and are based on the provisions cited above. The measures are: (1) expediting Delayed Compliance Orders pending before EPA to permit coal conversions; (2) seeking revisions to the requirements of State Implementation Plans and Delayed Compliance Orders and reversal of a court order to expedite the coal conversion for

one particular generating station; 1/ (3) using existing emergency authority to temporarily waive state environmental requirements, prohibit oil use, and allocate coal and materials to expedite the coal conversion process; (4) seeking new legislation to allow conversions in facilities with coal burning capability that cannot convert because of strict environmental regulation.

Oil displacement potential

DOE estimates that the measures outlined above could potentially displace up to 213 MBD by the end of 12 months depending on the combination of actions pursued. Potential savings during the first six months of the program would be considerably less, totalling only 5 MBD, due to the lead time required on several of the measures, as shown in Table 2.

1/A York County, Virginia court order precludes coal burning at the generating plant. The court order is a consent agreement between VEPCO and the State of Virginia in which VEPCO agrees not to burn coal at the Yorktown facility. The measure proposed by DOE would be for the Department to work with VEPCO and State authorities to try to reverse this court order. The measure would save 5.3 MBD.

Table 2

DOE's Estimates on Oil-to-Coal Switching
(As of March, 1981)

Measures	Oil Displacement Potential (MBD) First 6 months	Second 6 months
Expedite pending DCO's, revise State Implementation Plans and reverse court order		
(1) Seek State Implementation Plan and DCO Revisions	0	50
(2) Reverse Yorktown court order	5	5
Invoke existing emergency authorities		
(1) State environmental waivers	0	15
(2) Prohibit oil use in identified facilities and allocate coal	NA	NA
Seek New Legislation	0	143
Total	5	213

NA=No estimate available.

The maximum savings identified represent oil displacement that could be achieved by seeking authority to order 19 powerplants with coal-burning capability to switch, assuming that all the relevant legal, environmental, and regulatory constraints at the Federal and State levels can be removed. DOE's draft plan identifies several Federal laws and State/local regulations that need to be changed. While specific proposals for changes are identified, there is no discussion of how this would be accomplished. We believe that this would require coordination with EPA and the U.S. Congress. Much time and effort are involved in acquiring environmental waivers and changing legislation. Because of these long lead times, we believe that DOE's oil saving figures in the coal-switching area are overstated.

Even those actions which do not require new legislation such as State Implementation Plan revisions, reversal of the Yorktown court order and oil use prohibition generally involve cumbersome

and time-consuming procedures. Therefore, they are unlikely to be effective for contingency purposes unless they are changed.

Program deficiencies

DOE's draft emergency oil-to-coal conversion program cannot be considered an effective mechanism for dealing with an oil supply disruption. The program lacks some basic elements which characterize a sound contingency plan. Implementation schedules, sequences of actions to be taken before and during the disruption, compliance and enforcement mechanisms and resource requirements have not been specified.

More importantly, some of the measures outlined in the plan could not be implemented quickly or easily. For example, it would take at least 4 to 6 months to process Delayed Compliance Orders and revise State Implementation Plans according to DOE and EPA. To obtain a Delayed Compliance Order, a utility must be able to demonstrate that its emissions from burning coal will not significantly affect the area where the powerplant is located. The order must contain a schedule and timetable providing for compliance with the requirements of the applicable state plan. The requirements call for formal rulemaking, including notice and opportunity for a hearing.

State plan revisions, initiated by the States and approved by EPA, also involve air quality modeling, analysis, and public hearings. Some of the information can be gathered prior to the onset of an actual emergency, but this has not been done. DOE's plan does not outline a specific set of actions or time schedule to accomplish this. It seems unlikely that DCO and State plan revisions can be done in a timely fashion for contingency purposes, particularly if steps are not taken in advance.

Obtaining a 110(f) waiver is not a simple task. According to DOE and EPA, if data is readily available a waiver could be issued in 1-1/2 to 3 weeks. However, the timing could vary according to the severity of the disruption, the data needs and manner in which the waiver provisions are implemented. To obtain a waiver, utilities must apply for it. Then the State governor must demonstrate that an energy emergency of such magnitude exists that would cause high levels of unemployment or loss of necessary energy supplies for residential dwellings. Public hearing must be held. Upon demonstrating that the waiver would alleviate the problem and that no other means adequately address the emergency, the governor would request the President to declare that an emergency exists so as to warrant waivers. 1/ According to the draft plan, DOE's role in obtaining a waiver would be to assist utilities, States, and EPA in collecting the necessary information to document that an emergency exists.

1/See p. IV-22 for a more detailed discussion of the procedures involved in obtaining 110(f) waivers.

Better planning is also needed to effectively implement emergency oil prohibition orders under FUA. These orders require careful attention to Clean Air Act requirements. A prohibition on oil use probably would not promote coal burning unless environmental waivers are provided. The oil displacement potential of this measure is uncertain. According to DOE, oil savings will depend on the number of facilities that could burn coal but face environmental restrictions or are unwilling to commit the funds necessary to accelerate permanent coal conversion.

Another measure which has not been fully developed is new legislation to allow coal switching in facilities which currently have the capability to burn coal. DOE estimates this measure could displace about 143 MBD (67 percent of the total oil offset potential in the coal conversion area) if the laws are modified. Such legislation has not been drafted and presented to Congress. As is the case with other coal-switching measures, the plan does not detail a specific course of action needed to ensure that the measure could be quickly implemented during a crisis.

Besides the inadequacies discussed above, DOE's draft plan does not adequately address logistical contraints to accelerating permanent coal conversion. The draft does not identify the type of expenditures and facilities involved or the time requirements. The plan only states that DOE will provide assistance to "help identify specific impediments to coal conversions and that once identified, efforts will be made to eliminate them." It does not say exactly how or when this will be accomplished. Furthermore, the plan does not make a clear distinction between cases where units could switch easily for the emergency period and those where plans for permanent conversion could be accelerated to address an emergency.

Because of the deficiencies outlined above, it is unlikely that the oil-to-coal conversion program can accomplish the level of oil displacement anticipated in DOE's draft plan in a timely fashion. Much more planning needs to be done to make this program a sound, workable contingency program.

Conclusions

DOE's measures to accelerate oil-to-coal conversions attempt to deal with some environmental factors, but timing considerations which are crucial to contingency planning are overlooked.

The plan does not distinguish clearly between actions which could be taken in preparation for and during a supply disruption. Many activities could begin now, but no steps are being taken in this direction.

More action is needed to secure the maximum oil savings and to make this a program area that can be counted on for emergency purposes. This involves designing measures that are standby in nature and whose workability is tested in advance. A mechanism

is needed to provide reliable information and enable quick implementation of the measures proposed in DOE's plan.

ELECTRICITY SUPPLIES AND TRANSFERS 1/

DOE has been working closely with industry in developing an electricity sector emergency response plan for dealing with oil supply disruptions. Considerable progress has been achieved in identifying specific emergency responses and impediments to plan implementation, designing an appropriate management system, and coordinating with affected parties.

The electricity response measures contained in DOE's March 24, 1981, draft plan are: increasing electricity transfers and monitoring and expediting the start-up of new coal-fired units and nuclear generating facilities. The Department estimates the measures would save a maximum of 242 MBD. Fifty four percent of the total would be acccomplished in six months, mostly through electricity transfers. Small savings are expected from the accelerated completion of coal-fired units and savings through accelerated start-up of new nuclear plants could be achieved only after 12 months. The draft plan does not discuss the prospects for increasing electricity imports. (A breakdown on oil savings by type of measure is shown in Table 3.) The estimates represent the maximum oil displacement potential given several constraints. These are: transmission capability in specific locations at appropriate times; need to remove non-oil-fired generating units from service to perform maintenance; cyclic nature of electricity demand and the need to monitor reliability in the electrical system. DOE's savings estimates reflect data available at the time of preparing their plan and could vary according to the circumstances present at the time of a disruption. In particular, the savings identified for the last two measures outlined above could change depending on the number of units that are close to completion at any point in time. Achieving the full potential would also depend on the cooperation of the electric utility industry. DOE has established a working relationship with industry. Their cooperation in contingency planning has been excellent, according to the Department.

1/In this section we do not address the U.S. Government's readiness to deal with electric power emergencies caused by war, sabotage, or terrorism. GAO recently published a report on this subject entitled "Federal Emergency Preparednessd is Inadequate," EMD-81-50, May, 1981.

Table 3

DOE's Estimate for Emergency Measures in the Electricity Sector

	Oil Displacement Potential(MBD)	Lead Time (months)
ELECTRICITY TRANSFERS		
--increased intensity of monitoring activity	30	3
--orders to mandate transfers	100	6
Expediting Start-Up of New Coal-Fired Units	26	6-12
Expediting Start-Up of New Nuclear Generating Facilities	86	after 12
TOTAL	242	

DOE has contacted other government agencies in developing the electricity response plan. The role of state regulatory agencies has also been adequately established.

Electricity Transfers 1/

As a result of the coal strike of 1979, ERA's Division of Power Supply and Reliability instituted a monitoring program to track electricity supply and demand requirements. ERA conducts weekly audits on the effectiveness of industry's effort to reduce oil use through use of alternate fuels and transfers of electricity between regions. The program, which is voluntary, has been in operation for about 2 years and demonstrates the ability of the electric utility industry to save oil in this manner. Oil savings through this mechanism have reached 300 MBD. It is economically attractive to engage in this type of transaction since it is cheaper to generate electricity from coal, hydro or natural gas than it is to use oil. DOE and industry officials told us that since utilities are already minimizing oil use by transferring power within and among systems there is only about 30 MBD additional potential through voluntary action.

Section 202 of the Federal Power Act provides the basis for promoting voluntary interconnections and electricity transfers. DOE's draft plan states that the full transfer potential identified in Table 3 would be achieved through intense monitoring efforts

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1/Electricity transfers as used here refer to inter-utility and inter-regional flow of electricity from non-oil-fired generating units to oil-fired units.

and use of mandatory authorities available under the Federal Power Act -- Section 202 (c) and (d). These provisions of the Act authorize the Federal Government to order the interconnection of electric power facilities or the generation and transfer of electric energy over existing transmission lines during a severe emergency. Additionally, the EPAA provides authority to order oil curtailment or interruption at specific generating stations to force electricity transfers.

However, the oil savings that can be achieved through transfers vary on a seasonal basis. The potential that can be realized depends on regional demand and the availability of non-oil-fired generation capacity.

Expediting start-up of new coal-fired units

DOE's contingency plan outlines several steps that would be taken to expedite the start-up of new coal-fired units nearing completion. These steps are: monitoring the construction progress on new coal-fired units; identifying the oil displacement potential for each pending unit; contacting utilities to identify causes of delays and the parties responsible for bringing the units on line; identifying Federal authorities required and expediting requests for waiver of Clean Air Act requirements as applicable. These actions would save 26 MBD within six to twelve months. The savings reflect data on the number of plants near completion as of March 1981. This estimate excludes the savings that can be realized by transferring electricity from the new coal-fired plants to other regions to displace oil. The estimate takes into account the fact that new coal units do not always displace oil because they may be replacing the output of less efficient coal-fired units. The units which DOE identified as capable of displacing oil within the short term are shown in Table 4. By the publication date of this report, some of these units will have come on line. It is possible that other units could be added to an updated list.

Table 4

DOE March 1981 Estimate of
Planned Coal-Fired Generating Units
Expected to Displace Oil Within Their
Region Upon Start-Up

	Rating (MWe)	Construction Completion Date	Estimated Daily Oil Displacement (barrels)
White Bluff 2	740	5/81	4,000
Coyote 1	410	5/81	3,000
Daniel 2	503	6/81	2,000
Cholla 4	347	6/81	4,000
McIntosh 3	334	10/81	4,000
Valmy 1	250	10/81	5,000
Gentlemen 2	600	11/81	4,000
	3,184		26,000

NOTE:
Other large coal-fired generating units are also scheduled for completion during this timeframe, but are not expected to displace oil within their region. Oil displacement that may be achieved by these units is covered in the transfers section.

The program is voluntary. The role of the Federal Government would be to try to maintain the construction schedules on time or accelerate them by a few months. But their timely completion would depend also on the cooperation of state regulatory bodies and constructing utility.

Expediting nuclear plant start-up

DOE currently monitors and updates the construction program for each new nuclear generating unit nearing completion. For emergency purposes, DOE would attempt to expedite start-ups.

The actions in this area outlined in DOE's contingency plan include: increasing coordination and interaction with the Nuclear Regulatory Commission to expedite nuclear plant start-ups; contacting utilities and State regulatory agencies to identify and assist in removing constraints and contacting other Federal agencies which have a role to play in the licensing of the units. DOE estimates these actions would displace about 86 MBD after 12 months of the program. The savings reflect data on units that were scheduled for completion as of March 1981. As time passes the potential is likely to change. The estimate represents oil savings that will be achieved as a result of normal additions

of nuclear plants. However, DOE states that in the past its analyses on the need for nuclear power have contributed to accelerating the start-up of some units by about 3 months, displacing 21 MBD of oil temporarily.

The nuclear units identified by DOE as candidates for accelerated completion schedules are shown in Table 5.

Table 5

DOE March 1981 Estimate of
Nuclear Units Considered as Potential
Candidates for Accelerated Start Up

Unit	Net Rating MWe	Construction 2/ Completion Date	Anticipated Full Power Operation	Estimated 1/ Oil Displacement
				(barrels per day)
Sequoyah 1	1,148	Sep 80	Mar 81	6,000
Salem 2	1,115	Oct 80	Jun 81	24,000
Diablo Canyon 1	1,084	Jan 81	Sep 81	14,000
McQuire	1,180	Dec 80	May 81	5,000
Farley 2	829	Oct 80	Jun 81	4,000
LaSalle 1	1,078	Dec 80	May 81	15,000
Diablo Canyon 2	1,106	Jun 81	Dec 81	12,000
Sequoyah 2			Oct 81	6,000
				86,000

1/Oil displacement is the daily average at the end of the period. Values for displacement have been determined after considering unit maturity. Litigation could impose significant delays.

2/NRC must make the appropriate statutory findings before operation is approved. Estimated construction completion date does not necessarily indicate that the reactor will be licensed for full power operation by that date.

Regulatory and legislative requirements are likely to impede accelerated start-up of nuclear power plants. Delays inherent in the existing administrative and regulatory structure, certain legal requirements under the Atomic Energy Act of 1954, the National Environmental Policy Act, and other Federal and State laws can present major problems.

Public opposition to the start-up of new nuclear units can also delay the process. The procedures involved in bringing new units on line are complex. While the administration is now attempting to streamline the permitting requirements we believe that it would be difficult to further expedite the process during an emergency.

Prospects for increasing electricity imports

Although DOE's contingency plan does not include actions to improve electricity imports, the Department has been examining the opportunities for increasing these imports during an oil supply disruption. While DOE has not reached any final conclusions in this area it does not seem like this option will be able to contribute much to offset a major crisis if this occurs in the near future.

Constraints to increasing imports

Several factors constrain the potential for increasing electricity imports during an oil supply emergency. In the near term, two key factors are generation and transmission capacity. Taking into account these factors, the NPC estimated that the additional import potential from Canada is limited to a maximum of 35 MBDOE in the near term. There is a substantial potential for developing additional Canadian power but it would take several years to accomplish. However, transmission capacity may not be a problem further in the future since transmission lines of about 4500 megawatt capacity are scheduled for completion by 1985.

Imports from Mexico are presently constrained by technical programs. DOE officials stated that Mexican and U.S. utility systems have compatibility problems and may not be able to operate in synchronism. It may be possible to isolate a specific region, but even this would require construction of certain facilities.

A number of institutional and regulatory constraints may also limit the potential for increasing electricity imports. Government approval procedures in the United States are complex and differ substantially from those in Mexico and Canada. For example, in the United States, procedures are generally time consuming because a Presidential permit, approval of several federal and State agencies, and public hearings are required. While DOE has the authority to issue licenses for electricity exports and construction of international electric power transmission lines, Canadian authorities must approve the export of additional power to the United States. Hence, the opportunities for increasing electricity imports are subject to the uncertainty of the exporting country's willingness and ability to make extra supplies available for export.

Summary

DOE'S contingency planning document goes a long way in identifiying emergency response actions in the electricity area. The major aspects of a contingency plan are adequately addressed (e.g., savings potential, timeliness, constraints, and coordination). The most promising measure seems to be electricity transfers. The savings potential associated with the start-up of new nuclear units is relatively high but could not be achieved quickly. Small savings are expected from the start-up of new coal-fired

units. In the near term, increasing electricity imports does not seem to be a promising option.

WAIVING CLEAN AIR ACT STANDARDS TO ALLOW HIGH-SULFUR RESIDUAL FUEL OIL USE

Under some scenarios, high sulfur residual fuel oil is expected to be available to replace other types of residual fuel oils. However, State Implementation Plans prepared in response to requirements of the Clean Air Act generally prohibit the burning of high sulfur oil. For contingency planning purposes, DOE has analyzed requirements for implementing section 110(f) of the Clean Air Act whereby end users can obtain temporary emergency suspension of a State Implementation Plan and thus use high sulfur resid. To waive Clean Air Act standards, the emergency must be of such nature that it causes high levels of unemployment or threatens a loss of necessary residential energy supplies. If implemented, these waivers would save very little oil, only 14 MBD, and involve time consuming findings and burdensome administrative procedures.

DOE's planning document describing this response measure is essentially an analysis on the applicability of Section 110 (f) of the Clean Air Act to contingency planning. Specifically, the document describes the procedures involved in acquiring waivers of clean air standards to allow use of high sulfur oil, identifies information requirements, and provides a qualitative discussion of the costs and benefits of using this measure. These issues are well addressed. However, this document cannot be considered a contingency action plan since it does not provide specific guidelines as to what DOE could do prior to or at the onset of a disruption, detail implementation schedules, or propose organizational mechanisms to insure that the measure can be successfully implemented.

Furthermore, the administrative procedures and data gathering requirements could take time, since they are not designed for responding to a national emergency. For example, to implement the suspension provisions, the owner or operator of an electric utility or major fuel burning industrial plant must request the State Governor to petition the President to declare a national or regional energy emergency. The Governor must then provide notice and opportunity for public hearings. If he finds that a temporary energy emergency involving high unemployment levels or loss of necessary residential energy exists near the plant, the Governor can ask the President to declare that an energy emergency exists of such severity that a waiver of the State Implementation Plan is necessary.

If the President makes that determination, the Governor can issue a temporary suspension of any part of an applicable State Implementation Plan. Only one such suspension, limited to 4 months, may be issued to a single facility for each emergency condition. Primary responsibility for implementation rests with the States. However, the Administrator of EPA may disapprove or place

conditions (such as reducing the duration of the waiver) on any suspension under Section 110(f) if he determines the Governor's finding was in error.

If the required data is available and the Governor's findings are correct, the waiver could be issued within 8 to 21 days. DOE's draft does not provide a time schedule regarding data collection. This estimate of the time involved in seeking a waiver appears to be optimistic when considering the amount of data that is needed, the fact that the information is not readily available, and that the DOE draft does not outline a course of action for getting it. However, DOE recognizes that the key to expediting the waiver process is for the States and fuel users to identify information requirements and collect as much data as possible in advance. The States would have to identify the potentially affected parties. These include: end users claiming a fuel shortage, affected customers, and potential or actual supplies of high sulfur residual fuel to parties experiencing fuel shortages. The end users would have to prove inadequate supplies of the energy source that they have been using. The State would also need to obtain data on the nature, magnitude, and duration of an expected emergency. Some of the specific types of information required include:

--Monthly fuel demand by type for two calendar quarters before and after the waiver,

--Projected fuel shortage for the relevant period,

--Circumstances affecting fuel needs, e.g. abnormal weather conditions and changes in production levels,

--A profile on end users' fuel inventories with specifics on fuel type, fuel sulfur content, and storage and blending capacity,

--A historical comparison of fuel supplies and inventories over the last two years for each party seeking a waiver,

--Desulfurization or other fuel processing capacity of the source of fuel supply and a historical summary of such capacity,

--Alternate fuel supply availability and documentation of action taken to locate such fuels,

--Contractual arrangements between various parties, supplies and users and a description of the available options in the event of a fuel shortage.

--Current and projected loss of necessary residential energy supplies resulting from the emergency including the volume of losses, number of affected people, and their location,

--Facilities that may close down and the impact on employment,

--Facilities that can convert to alternate fuels and lead time required,

--Analysis on how the waiver might alleviate the shortage, and

--Steps the state would take to minimize environmental impact.

Compiling this information would be a major task. Furthermore, not all of it can be collected in advance.

Potential oil savings

DOE's estimates for energy savings from this action are small. The maximum savings would be 14 MBD. Even this low estimate, though, is based on the assumption that 110(f) waivers remove all environmental constraints on burning high sulfur residual oil. A single waiver would save only 250 BD. EPA officials say that the environmental costs of pursuing this action are high compared to the oil savings benefit. DOE's draft identifies three major environmental impacts: an increase of 1.3 million tons per year in sulfur emissions, increased sulfuric acid resulting in acid rain far from the emission source, and damage to vegetation and human health.

An EPA official also said that a waiver might not be necessary if there is a shortage of oil from the Persian Gulf, because that crude has a high sulfur content and there is no reason to believe that high sulfur residual oil will be in greater supply than low sulfur residual oil. The United States obtains most of its low sulfur residual supplies from two sources: (1) Crude oil domestically produced and imported from Nigeria, Libya and Indonesia, and (2) Caribbean refineries which desulfurize high-sulfur crude.

The potential consumers of high sulfur residual oil are powerplants and major industrial installations which currently use other types of residual oil but have the technical capability of using high sulfur oils.

While there is some disagreement on the need for allowing the burning of high sulfur residual oil, both DOE and EPA officials seem to agree that the measure would be helpful, among other things, in preventing plant shutdowns and layoffs, minimizing potential energy shortages to residential users, allowing refineries more flexibility to substitute available crudes to match critical demand for certain products, and reducing the upward pressure on crude prices.

Conclusions

DOE prepared a planning document which outlines the requirements for obtaining high sulfur residual oil waivers. This

document, however, cannot be considered an action plan for use during an oil disruption emergency.

The need for obtaining waivers appears difficult to be justified because a waiver would displace very little oil, the environmental cost would be high, and there is no certainty that high-sulfur residual oil will be in adequate supply in all disruption scenarios.

CHAPTER V

DEMAND RESTRAINT

Demand restraint (DR) means cutting consumption quickly when energy supplies are abruptly curtailed. It is also frequently characterized as emergency conservation. Demand restraint differs from conservation taken under normal conditions to gradually reduce energy use because it must be effective quickly. Unique among contingency measures because it calls for direct participation by consumers, demand restraint can be a valuable tool for emergency management.

Demand restraint is often confused with long range conservation and some of the problems that plague contingency planning in this area stem from that confusion. DR may address the same areas of consumption as conservation but its utility rests on the rapidity with which results can be achieved.

Demand restraint encompasses many types of programs. For example, DR programs used in the past which require consumer participation include building temperature restrictions and the 55 mile per hour speed limit. Some programs included under DR are not technically restraints on demand. For example, closing gasoline stations on weekends restricts access to supplies as do alternative day gasoline purchase programs. Some DR measures do not actually save much fuel, but help maintain order in energy markets. Measures such as alternate day fuel purchases and minimum purchases have been used during past emergencies to calm the public and limit hoarding that frequently accompanies a sudden shortage.

Demand restraint programs include both mandatory and voluntary actions to save fuel. Voluntary demand restraint means that people are encouraged to cut back consumption. This works through public information and has a number of advantages. Voluntary programs provide the most individual flexibility and, therefore, are generally the most tolerable. Government control is minimized, so voluntary programs generate relatively little opposition.

Mandatory demand restraint involves compulsory government programs. Even well-designed, mandatory measures will probably involve greater hardship because they do not respond to individual needs. One positive attribute of mandatory measures is that they provide a sense of equity; although the mandatory approach may disrupt peoples' lives, everyone realizes that all are required to share the burden. Mandatory measures range from mild to extreme; the more harsh or restrictive ones can be held in reserve in case less stringent approaches do not work. In a severe disruption, mandatory measures may help to hold prices down and thus any inconvenience that they may cause to some could be viewed in the light of hardships averted for many.

Demand restraint is a vital part of contingency planning that should not be overlooked. The Federal Government, however, has few DR programs ready to use in an emergency. A number of GAO studies since the 1973 oil embargo have documented the DOE's lack of progress in developing DR programs. 1/ A few measures are still on the books from past legislative efforts, but DOE is moving away from Federal involvement in demand restraint.

OVERALL ROLE THAT DEMAND RESTRAINT SHOULD PLAY IN EMERGENCY PREPAREDNESS NOT CLEAR

Federal contingency planners have never clearly identified the role which demand restraint should play with the Nation's overall response to oil supply shortfalls. They have not specified how much oil should be saved by demand restraint programs nor have they specified the savings that should be achieved by voluntary and mandatory demand restraint programs.

The Emergency Energy Conservation Act (EECA, P.L. 96-102) stipulates that demand restraint should be used to control shortages which are too small to impose rationing, but DOE has not specified to what extent DR will be employed before the rationing threshhold of 20 percent shortfall is reached. DOE also said that even with rationing in effect, DR programs might still be used.

The laws which authorize Federal DR do not specify a minimum shortage threshold that must be reached before programs should be put into operation. In fact, DR can be used if the President determines that a disruption is imminent. A well planned DR strategy can therefore be implemented quickly, even before the start of a disruption, to offset the panic and hoarding that

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1/Letter report to Senator Henry Jackson on FEA's Coal Conversion Program, (EMD-77-66; 9/16/77); "More Attention Should Be Paid to Making the U.S. Less Vulnerable to Foreign Oil Price and Supply Decisions," (EMD-78-24; 1/3/78); Letter report to the Secretary of Energy on DOE's Actions to Develop Contingency Plans, (EMD78-59; 4/27/78); "The Federal Government Should Establish and Meet Energy Conservation Goals," (EMD-78-38; 6/30/78); "Improved Energy Contingency Planning is Needed to Manage Future Energy Shortages More Effectively," (EMD-78-106; 10/10/78); Letter Report to Congress on Energy Conservation Programs and Policies Implemented Since the 1973 Oil Embargo, (EMD-79-43; 2/13/79); "Analysis of the Energy and the Economic Effects of the Iranian Oil Shortfall," (EMD-79-38; 3/5/79); Factors Influencing the Size of U.S. Strategic Petroleum Reserve, (ID-79-8; 6/15/79); Letter report to Senator Jackson summarizing a GAO review of the measures in DOE's Iranian Response Plan, (EMD-79-88; 8/27/79); "Iranian Oil Cutoff: Reduced Petroleum Supplies and Inadequate U.S. Government Response," (EMD-79-97; 9/13/79); "Gasoline Allocation: A Chaotic Program in Need of Overhaul," (EMD-80-34; 4/23/80).

may accompany an emergency. DR programs, in contrast to supply enhancement measures, address the ultimate consumer and can therefore promote an orderly public response to a crisis.

FEDERAL GOVERNMENT APPROACHES TO DEMAND RESTRAINT HAVE YIELDED FEW RESULTS

The Emergency Petroleum Allocation Act (EPAA) of 1973 gave the President authority to establish motor fuel end user allocation measures, such as odd/even and minimum purchase, and restrictions on retail service station hours. The Act also authorized the President to delegate this authority to the States, which he did in the Spring of 1979 during the Iranian oil shortfall. This authority was used by the States during that shortfall but not by the Federal Government. The EPAA will expire at the end of September 1981, and unless it is extended, these measures will no longer be authorized.

The Federal Government subsequently tried two other approaches to DR, also mandated by legislation. One law was passed in 1975; another was passed in 1979 to require the development of comprehensive DR plans. Neither law has produced such plans to date.

The Energy Policy and Conservation Act

The Energy Policy and Conservation Act (EPCA) of 1975 (P.L. 94-163) gave the Executive Branch the lead role in demand restraint contingency planning, and assigned Congress a key authorizing role in its implementation. The Act required the President to develop "one or more energy conservation contingency plans" (Sec. 201) and to transmit them to the Congress within 180 days. The President may at any time submit additional plans. To be used, a plan must first be approved by resolution in both Houses of Congress and activated after the President determines the plan is needed because of a severe energy supply interruption. The President must transmit his findings to the Congress, stating the effective date of implementation and how the plan will be carried out. No plan can remain in effect longer than 9 months without being renewed. Plans submitted under EPCA must contain an explanation of the need for the plan and an evaluation of its economic impacts, including its effect on: (1) vital industrial sectors; (2) employment, both national and regional; (3) economic vitality of States and regions; (4) availability and price of consumer goods and services; (5) gross national product; and (6) competition.

EPCA defines an "energy conservation contingency plan" as one which "imposes reasonable restrictions on the public or private use of energy which are necessary to reduce energy consumption" (Sec. 202). Under the act a plan cannot impose rationing or any tax, tariff, or user fee, or contain any provision respecting the price of petroleum products or provide for a credit or deduction in computing any tax. A plan shall apply in every State unless an

area is exempted because the President determines that there are special circumstances or a comparable plan is already in effect.

Although EPCA required that the President submit one or more plans to Congress within 180 days, no plans were submitted for four years. Finally, in 1979, three demand restraint plans were sent to Congress in the midst of the Iranian oil supply shortfall. These called for:

--Limitations on outdoor advertising lighting;

--Emergency building temperature restrictions (EBTR); and

--Restrictions on weekend gasoline sales.

Of the three, only EBTR was approved by the Congress. It was put into effect in July 1979, and was operating until February 1981, when President Reagan withdrew it. Based on information generated by the EBTR program, DOE estimates that an average of 379 MBDOE (160 MBD of oil) was saved.

EBTR can still be used in future disruptions. However, savings achieved the next time around would not be nearly as great. According to DOE, many buildings which adjusted building temperatures during 1979-1980 have now incorporated these temperatures into normal operations. Future savings are estimated at about half those experienced in the past, approximately 80 MBD.

By any reasonable standard the Executive's implementation of EPCA must be considered a failure. Only one plan has ever been approved by Congress, and that would be of limited utility in the future. As a result of substantial lobbying from State governments, to try a different approach, Congress passed the Emergency Energy Conservation Act (EECA, P.L. 96-102) late in 1979. The Executive can still prepare demand restraint plans under EPCA and submit them to Congress; however, EECA has dominated DOE's approach to demand restraint since its passage.

The Emergency Energy Conservation Act (EECA)

EECA assigns the States a key role in demand restraint planning and program implementation. The Federal role is largely one of leading and coordinating States' preparation of contingency plans. The Federal Government's ability to take the initiative, should the need arise, is severely circumscribed. Congress' role is also limited--to providing funding for the Executive Branch's activities and, if Congress desires, providing funding to assist the States. Direct Congressional approval or rejection of specific plans is not a part of the EECA process.

EECA required DOE to establish a Standby Federal Emergency Energy Conservation Plan (hereafter called the Federal Plan) within 90 days of the law's enactment. The Federal Plan is to serve as a guide to preparing individual State demand restraint

plans and as a backup to be used by the Federal Government in case a State plan fails to work effectively during a disruption.

The primary role for demand restraint planning and program implementation is assigned to the 50 States (plus 7 other U.S. jurisdictions). EECA requires each to submit a demand restraint plan to DOE for approval if the President determines a severe energy supply interruption exists or is imminent and establishes monthly emergency energy conservation targets. DOE is responsible not only for approving or rejecting plans, but also for monitoring each State's performance in meeting the targets. If a State is not meeting the targets, the President can initiate action to impose parts or all of the Federal Plan in that State. Before the Federal Plan can take over, however, a number of complex, time-consuming requirements must be met.

The EECA approach is based on the principle that because energy consumption patterns vary significantly across States, States should have a leading role in demand restraint planning. The assumption is that a Federal demand restraint plan which applies to all States will, because of State differences, not meet the needs of each State and could even be counterproductive in some. Presumably, if every State designs its own programs geared to its particular circumstances, the results for the Nation as a whole will be better and more easily and efficiently achieved.

EECA requires that demand restraint plans be prepared for gasoline, diesel fuel, home heating oil and other energy sources which may be in short supply. Under a separate title, EECA contains provisions requiring DOE to establish a gasoline rationing plan, but precludes the President from putting rationing into operation unless a shortage of at least 20 percent exists for gasoline, diesel fuel, and heating oil and a judgment is made that demand restraint measures cannot manage the shortfall. Therefore, it appears that DR plans should be designed to manage shortages as high as 19 percent for gasoline, diesel fuel and heating oil.

EECA is burdened by numerous problems. Some of these arise from procedural constraints mandated by the law. These constraints significantly impede, or even negate effective demand restraint planning and program implementation during an energy crisis. Other problems arise from the way in which DOE and, to a lesser extent, the States, have gone about implementing the law.

PROBLEMS WITH EECA: PROCEDURAL CONSTRAINTS

Under EECA, States are encouraged to prepare demand restraint plans and submit them to DOE as soon as possible. However, the law does not require them to submit plans before a disruption. Furthermore, such submissions are for review and advisory purposes only. DOE cannot officially act on State plans until: (1) the President finds that an energy emergency exists or is imminent;

and (2) the President publishes energy emergency conservation targets for each State.

Consequently, this procedure allows States to delay planning for DR until they are actually faced with a crisis. Most States have, for a variety of reasons, not submitted plans to DOE for advance review. Once the President finds that an emergency exists and publishes emergency conservation targets, States have 45 days to submit their demand restraint plans to DOE. This schedule reduces the likelihood that demand restraint programs will achieve their objectives during a disruption, especially in the early stages.

Once a State has submitted its plan to DOE, the Department has up to 30 days to approve or reject. Even if a State had submitted it previously, the plan must be reviewed again once emergency targets are set. DOE's ability to effectively review 57 plans within a period of a few weeks is questionable. The temptation may be strong to approve plans regardless of their evident merit, and hope for the best. This is true for several reasons.

If DOE determines that a State's plan should be rejected and the President agrees, EECA requires that the President personally confer with the State's Governor. A State can appeal a Federal plan rejection or targets to the Federal courts. The courts cannot issue an injunction to stop actions required by targets or permitted to the Federal Government if a State plan is rejected. But once a case is decided, the decision is binding unless overturned by a higher court of appeal. This means, for example, that although a State cannot ignore a target while it goes to court, if the court decides for the State, the target is removed unless and until the case is appealed and won by the Federal Government. In an energy emergency, appeals could consume not only calendar time but also valuable staff time that would otherwise be used to manage the emergency.

If DOE approves a State's plan, the State must be allowed at least 90 days to put it into operation and demonstrate that the plan can achieve the demand restraint targets. It is perfectly reasonable that a period of time should be provided to determine whether or not plans are working. However, in view of other procedural delays that are designed into this system, the 90-day testing period further jeopardizes the usefulness of the EECA approach to demand restraint. As Table 1 demonstrates, on the basis of procedural requirements alone, 165 days could pass before the Government could impose the Federal Plan on any State. These legal limits are only the beginning, however, since EECA does not specify any limit on how much time can be taken by the President to determine that an energy emergency exists, to establish monthly emergency conservation targets for each State, and to consult with a State Governor if DOE finds that a State's plan is not working. These actions could easily take several additional weeks.

There are other reasons why the 165 days could be easily exceeded. For example, if DOE receives 57 plans at the same

time, it might not be able to observe the 30 day prescribed limit for approving or rejecting them. Another example: a time lag will necessarily precede any DOE determination that a State is not meeting its targets. States are allowed at least 90 days

TABLE 1

SCHEDULE OF EVENTS LEADING TO IMPLEMENTATION OF

FEDERAL EMERGENCY ENERGY CONSERVATION PLANS UNDER EECA

EVENT		TIME ALLOWED
1	President determines a severe energy supply interruption exists or is imminent.	No Limit
2	President establishes monthly emergency energy conservation targets for each State, notifies the State governors, and publishes the targets in the Federal Register.	No Limit
3	State governors submit state emergency conservation plans to DOE.	45 Days (maximum*)
4	DOE reviews plans and approves (or rejects) each plan.	30 Days (maximum)
5	State implements plan on a trial basis. DOE finds that plan is or is not achieving Federal targets for reduced consumption.	90 Days (minimum)
6	President confers with State governor about ways the State can meet its targets.	No Limit
7	President imposes Standby Federal Plan on state.	165 Days (probable minimum)

*Can be extended by DOE.

to operate their plans. However, to demonstrate that a State's plan is not working well enough, DOE must compile and analyze relevant data for the entire 90 day period. According to DOE officials we interviewed, present data systems contain at least a 60 day lag. Thus, 225 days (165+60) or more could pass before the Federal Government could impose its emergency Plan in any State.

If the Federal Plan is to be imposed in a State in which the State Plan is not working, an additional criterion must be met. The President must determine that the shortage will continue for 60 more days and will be at least eight percent of projected normal demand. Fulfillment of this requirement might further delay demand restraint action.

For effective demand restraint planning and program implementation to occur under the EECA approach, the 57 States and territories must prepare adequate plans and associated programs in advance of energy disruptions. They must be prepared to implement them immediately once a disruption occurs. There is no legal requirement that the States do this.

PROBLEMS IN EECA IMPLEMENTATION

Despite considerable activity by the Federal Government, and some by the States, there is essentially no Federal Plan and State plans are not ready.

Numerous problems characterize demand restraint contingency planning under EECA. Among these are:

--The Federal Plan is not completed;

--Measures suggested for the Federal Plan overemphasize gasoline;

--DOE's examination of the likely savings is inadequate;

--Federal guidance, support, and coordination with states has not been adequate;

--State plans are not ready; and

--DOE is not capable of monitoring State performance in implementing plans during an emergency.

The Federal Plan is not completed

As noted earlier, EECA became law in November 1979. It required DOE to establish the Federal Plan within 90 days. It is now almost 2 years since EECA was passed, and DOE has not yet completed the Plan. Moreover, DOE recently changed its approach to the Federal Plan, proposing to eliminate most of the measures.

DOE published an interim final version of the Federal Plan on February 7, 1980 which contained five measures. It also proposed four other measures for inclusion in the Plan. 1/ One of them was almost immediately withdrawn because it engendered a storm of protest. Scheduled dates for completion of the rest of the plan continued to be postponed throughout 1980. Then, in February 1981, one year after the Plan was published, DOE withdrew all the proposed rules and indicated its intention to eliminate three of the five final rules. However, DOE has never taken final action to eliminate them.

The following is a brief summary of the 9 original measures:

1. Minimum Automobile Fuel Purchase. (Final rule.) This is one of the two measures that will be left in the Federal Plan and is the only one separately authorized by EECA. Section 221 of EECA provides that minimum automobile fuel purchase can be implemented nationwide by the President whether or not it is part of the Federal Plan. Also, State Governors can request delegation of this authority from the Secretary of Energy.

2. Public Information. (Final rule.) This also remains in the Federal Plan. It would inform motorists about how to cope with a gasoline shortage and promote ridesharing and public transit. Information disseminated would address the efficiency of automobile travel, especially through lower speeds and reducing automobile travel by foregoing discretionary trips or taking other means of transit.

3. Odd-Even Motor Fuel Purchase. (Final rule.) This system, used by some States in past shortages, restricted gasoline purchases for a particular car to alternate days, according to license plate numbers. EECA specifically limits the use of odd-even by any State to that State and States contiguous to its borders. Drivers with license plates from other States could purchase gasoline any time.

4. Speed Limit Enforcement. (Final rule.) This was intended to save energy through increased compliance with existing speed limits. The program envisioned improved compliance to levels of 70 percent or more.

5. Employer-Based Commuter Travel. (Proposed rule.) This proposal would have required employers of 100 or

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1/The Federal Plan, as referred to here, includes those nine measures which DOE set out in the Federal Register on February 7, 1980.

more employees to develop programs to reduce work-related travel by their employees. The strategies which employers could use fall into two categories: (1) carpool, vanpool or prepaid public transit; and (2) parking management.

6. Compressed Workweek. (Proposed rule.) The compressed workweek proposal would have required all but exempted employers to reduce the workweek by 1 day. To the extent practicable, a uniform closing day for all affected activities would be established. Monday or Friday closings were recommended to minimize disruptions. Each establishment and its workforce would decide whether and in what manner to make up the work time from the idle day.

7. Vehicle-Use Restriction Sticker. (Proposed rule.) This proposal would have required all private and business motor vehicle owners to forego use of their vehicles for 1, 2, or 3 days per week, depending on the severity of the shortage. Owners would be required to place a coded sticker on their vehicles indicating the days on which driving is prohibited. The choice of which days of the week would be a collective decision of individual vehicle owners in a household, and all of their vehicles would be required to remain parked on the same day or days.

8. Emergency Building Temperature Restrictions. (Final rule.) This program was imposed nationwide in July 1979, under the authority of EPCA. It was renewed twice and remained in effect until February 1981. The measure was included in the interim Federal Plan in order to encourage States to develop their own individual programs. Restrictions were placed on thermostat settings for heating, cooling, and hot water in commercial, industrial, and other non-residential buildings. It was the only measure in the Federal Plan not exclusively related to motor fuel. Even if temperature restrictions are withdrawn from the Federal Plan, they could still be imposed by the President nationwide under the authority of EPCA.

9. Recreational Watercraft Restrictions. (Proposed rule.) These restrictions were proposed in the February 1980 Federal Plan, but were quickly withdrawn as a result of strong expressions of opposition directed at both DOE and Congress. The regulation would have prohibited the operation of private recreational motor boats on Sundays, or during the entire weekend. After holding public hearings, DOE concluded that

the restrictions unfairly targeted one particular business sector, and eliminated the measure from the Plan. The Appendix at the end of this chapter reviews how the recreational watercraft regulation originated in DOE and the opposition that developed once the measure was formally proposed. It is an excellent case study of how not to develop demand restraint programs.

The Federal Plan published by DOE in February 1980 outlined and discussed additional ideas that DOE said the States might want to consider for inclusion in their individual plans. DOE had not incorporated any of them into its Plan because they could have violated provisions of EECA if they were implemented on a nationwide basis. DOE said these measures might prove beneficial in some States but be counterproductive in others. DOE warned that programs "must be tailored to each State's specific circumstances," and said that "if any of these measures are adopted for incorporation into State plans, the State should identify the circumstances affecting its choice of these measures." 1/

The other measures set forth by DOE dealt with: school schedule modifications, residential emergency building temperature restrictions, electricity supply cutbacks, electric utility emergency conservation, commercial/industrial boiler efficiency improvements, industrial and utility fuel-switching, and reduced lighting energy use.

To summarize, EECA required DOE to establish a Standby Federal Demand Restraint Plan by February 1980. DOE published an interim final Plan in February 1980 which contained nine measures. Of the 9 one was withdrawn within weeks of its announcement, and 6 of the remaining 8 were proposed to be eliminated from the Plan one year after it was issued. If DOE's latest proposal becomes a final, only 2 alternatives will remain--public information and minimum automobile fuel purchases. As is discussed in the next section, the oil savings which can be anticipated from using these measures are minimal. Equally important, no standby programs to implement these measures have been developed by DOE. Thus, the Federal Government currently has virtually no EECA programs available for emergency demand restraint.

Measures suggested for the Federal Plan overemphasized gasoline

The two measures which will remain in the Federal Plan address only gasoline. Even before the plan was gutted, only emergency building temperature restrictions addressed fuels other than gasoline. Demand restraint planning under EECA has ignored the provision requiring that demand restraint plans be prepared for "gasoline, diesel fuel, home heating oil, and other energy sources which may be in short supply."

1/Federal Register, February 7, 1980, p. 8486.

DOE's concentration on gasoline to the near exclusion of all else appears to be due to at least two reasons. First, as DOE officials told us, the Department does not have adequate data on State-by-State consumption of other petroleum products and hence the President could not assign emergency conservation targets to the States that DOE would be capable of monitoring. However, this reason is somewhat specious, because DOE officials also told us that their data systems for gasoline consumption are not adequate to monitor compliance.

A second reason for concentrating on gasoline is the assumption, apparently untested, that gasoline use is more discretionary than other petroleum use. Because the transportation sector uses about one-half of the Nation's average daily consumption of petroleum products and because "the greatest potential for fuel savings in transportation exists in the use of gasoline in passenger automobiles, the DOE has chosen to concentrate its efforts on gasoline. 1/ These may in fact be good reasons for developing demand restraints aimed at gasoline, but DOE has concentrated potential savings in only one sector rather than promoting demand restraint in the use of diesel fuel for trucks, agriculture, and heavy equipment, heating oil by millions of home owners and businesses, jet fuel by the airlines industry, and distillate and residual fuel oil by industry. The savings that might be achieved in these areas could be significant.

DOE's examination of likely demand restraint savings is inadequate

DOE examined the potential of the Federal Plan to save oil, but the results are questionable. Reliable estimates are not available on the reduction in energy use that could be achieved by employing each measure separately in each State and DOE has no aggregate estimate of savings that would result from imposing some or all of the measures nationwide.

The original regulations were not intended to be implemented on a nationwide basis, but rather State-by-State, and only as appropriate and necessary. There was no study, however, of how they would affect each of the States. The States were encouraged to adopt them for their own plans. For a State to do so, however, it would need to have some idea of how much savings a given alternative could accomplish under local constraints.

The measures were not intended to be used all at once, but rather in a combination selected and agreed upon by the President and the governor of a particular State. No study was conducted to depict the restrictions' interaction with each other or which

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1/Federal Register, February 7, 1980, op. cit., p. 8489.

combinations of them would be most effective in which States. There is no indication of the range of savings that might be accomplished if several were implemented at one time.

Admittedly, it is not easy to estimate the savings which can be achieved. As DOE said in its February 1980, Federal Plan, "precise and accurate estimates of potential savings which could be achieved from implementation of standby emergency conservation measures are, at best, difficult to make. The success of any measure must be considered in the context of a variety of variables: market conditions at the time it is instituted, e.g., whether price controls are in effect; the extent of public compliance with its provisions, which in turn is likely to be in proportion to public perceptions of the magnitude and validity of the energy shortage; the availability of alternative means of transportation, such as ride-sharing, public transit, and other factors." 1/ The task is further complicated when most of the measures concern the same energy product and activity--i.e., gasoline and automobile transportation. For example, some of the gasoline savings estimated to result from employer-based commuter-travel planning might be negated by use of a compressed workweek.

In August 1980, Argonne National Laboratory submitted its report to DOE on the proposed Federal Plan. 2/ This analysis, required by Executive Order 12044, is intended to indicate the impacts of the proposed regulation and whether there is a preferred regulatory or nonregulatory alternative.

In spite of the qualifications on its utility by DOE, the Argonne analysis indicates the potential of the original Federal Plan to not only save gasoline but also to contribute to achieving an efficient and equitable adaptation to a sudden reduction in energy supplies, preserving mobility and reducing gas station queues.

Table 2 shows the Argonne savings estimates. As the table indicates, the estimated savings vary considerably and are often given in ranges, depending on how a measure might be applied. For example, speed limit figures are provided for savings resulting from (1) increasing enforcement of the existing nationwide 55 mph speed limit, (2) reducing the 55 mph speed limit, and (3) both reducing the speed limit and strictly enforcing it. DOE estimated that negligible savings would accrue from minimum automobile fuel purchase, the purpose of which was to impose order on the scramble by motorists for inadequate supplies of gasoline. By requiring that purchases be limited to a specified level, tank topping can be curtailed and gasoline lines shortened. For gasoline savings,

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1/Federal Register, February 7, 1980, op. cit.

2/Argonne National Laboratory, Regulatory Analysis for Title II of the Emergency Energy Conservation Act of 1979 (EECA), August 1980, p. 76.

TABLE 2

DOE'S ESTIMATES OF OIL SAVINGS THAT COULD BE ACHIEVED FROM FEDERAL PLAN MEASURES*

MEASURES	ESTIMATED SAVINGS (MBD)
Current	
1. Minimum Automobile Fuel Purchase	Negligible
2. Public Information Regarding Gasoline Use	65-130
Previously Proposed	
3. Odd-Even Motor Fuel Purchase	35-70
4. Speed Limits:	
--Increased enforcement of 55 mph speed limit	30-60
--Reduced speed limit	50-135
--Reduced speed limit and strict enforcement	164-306
5. Employer-Based Commuter Travel	35-70
6. Compressed Workweek	400
7. Vehicle-Use Restriction Stickers:	
--One day per week	260
--Two days per week	715
--Three days per week	1105
8. Building Temperature Restrictions (EBTR)	160
9. Recreational Watercraft Restrictions:	
--One weekend day	35**
--Two weekend days	85**
TOTAL	NA***

*These estimates are from the "Regulatory Analysis for Title II of the Emergency Energy Conservation Act of 1979," produced for DOE by Argonne National Laboratory in August 1980. Savings estimates are given as a percent of base consumption and have been extrapolated on the basis of a 7 percent disruption. They also assume measures are applied across the entire Nation. However, if used as part of the Federal Plan, measures can only be applied on a State-by-State basis, depending on whether or not a State has and employs an adequate plan of its own.

**These estimates are drawn from the Federal Plan published in February 1980. The measure was eliminated prior to the regulatory analysis.

***Savings estimates are not additive because there may be some overlap in savings.

vehicle use stickers stand out. If applied for one day a week, this might yield savings over 200 MBD; for two days a week, over 700 MBD; and for three days a week, over 1100 MBD. Not surprisingly, banning vehicle use would create considerable difficulties and hardships for many people.

Argonne estimated that the emergency building temperature restrictions produced savings of 160 MBD. In July 1979 the President decided to activate the program nationwide in response to the Iranian oil supply interruption. President Carter renewed it for another 9-month period in April 1980 and renewed it again in January 1981. President Reagan, eliminated the restrictions in February shortly after taking office. According to DOE analysis, many of the commercial, industrial, and other nonresidential buildings which lowered their thermostats to comply with this measure when it was in effect have continued to restrict settings.

Although DOE originally estimated that fuel consumption would fall by as much as 200-400 MBD 1/ actual savings were in fact only about 160 MBD. 2/ In a future disruption we estimate the program would save only about half of that. To achieve more savings would require setting more stringent temperature restrictions.

DOE officials we interviewed readily acknowledged that all of these estimates are quite subjective. In fact, the distinct impression they gave us was that they do not feel comfortable with nor attach much credence to the figures. When DOE published its plan in February 1980, it said that analysis was continuing. The August 1980 Argonne report on the effectiveness of the plan concluded that "many data gaps still exist regarding the response of the economy to energy shortages and what measures may most mitigate these impacts." 3/ The August figures were generally more conservative than the earlier estimates and were presented as percentages of base consumption. Actual savings would vary according to the size of the disruption.

It is important to point out, furthermore, that the figures presented in Table 2 are DOE's estimates of oil savings that might accrue if each measure were applied by itself on a nationwide basis. However, as discussed above, Federal standby demand restraint plans can only be implemented by the Federal Government on an individual, State-by-State basis, and only after lengthy prescribed conditions have been met. The estimates are not additive and might not be indicative of what could be accomplished in a future disruption even if all States included them in their individual plans. As will be discussed shortly, however, States have not done this.

1/Federal Register, February 7, 1980, op. cit. p. 8470.

2/Argonne National Laboratory, op. cit., p. 76.

3/ Argonne National Laboratory, op. cit., p. 33.

Consequently, DOE'S plan may now contain only two alternatives which do little to encourage and promote, much less achieve, demand restraint. Only public information could produce savings and these are estimated at 130 MBD or less. The details of a public information program have not been developed, however, so it is not available on a standby basis. Apart from the Federal Plan, EBTR may be ready. It has been implemented in the past and yielded approximately 160 MBD in direct oil savings. Its value in a future disruption is severely limited, however, by the degree to which new temperature limits have been permanently adopted and would probably yield about 80 MBD. New limits would have to be more severe if this is to save large amounts in the future. Speed limit enforcement is another area with reduced savings potential because of increasing compliance and would probably save 60 MBD or less. Provisions of the Surface Transportation Assistance Act (P.L. 95-599) require States to achieve a routine level of 70 percent compliance by 1983. To speed up this goal in an emergency would require a carefully planned approach which has not been prepared. To lower speed limits further would also require planning which has not been done. Some means of providing additional enforcement would have to be devised if the speed limit were to be used to restrain demand in an emergency. Odd/even has been used in the past and probably could save 70 MBD or less of gasoline if it were used again, but its authorizing legislation, EPAA, expires at the end of September 1981.

The combined savings from using these four measures--public information on gasoline use, EBTR, speed limit, and odd-even--would probably be under 340 MBD.

Given our obligation to the IEA to have demand restraint programs in place capable of offsetting up to 1.8 MMBD of an oil supply shortfall, it is obvious that the Federal Government's demand restraint programs are woefully inadequate. General authority exists under EPAA to restrict gasoline purchases, but measures have not been designed and the law expires in September 1981. Additional measures could be added under EPCA, but they have not been proposed. After years of demand restraint legislative mandates, DOE still has no standby DR plan.

Federal guidance, support, and coordination with States not adequate

The EECA assigns the States a key role in demand restraint planning. For this approach to be successful the Federal Government must collaborate with the States to set up viable programs. The Federal Government's performance in this area is far from adequate.

Under EECA, the demand restraint measures in the Federal Plan are to serve as examples which States could include in their plans. As discussed earlier, when DOE published the Federal plan in February 1980, DOE said that the nine approaches were specifically selected because of their applicability to States in general. DOE also outlined a number of other alternatives which the States might want to consider, but warned that they might not be useful in some States and in any case would have to be specifically tailored to each State's circumstances.

In fact, many of the ideas in the February 1980 Federal Plan had been used before. During past petroleum supply shortages, twenty-three states enacted legislation to relieve demand pressures. Many states used delegated EPAA authority to institute odd/even day purchases, maximum and minimum purchases, and reduced hours of operation for service stations (which is now prohibited for Federal use under EECA). The Oregon Gasoline Sales Plan, first voluntary and then mandatory, served as a model for other States. California, Connecticut, Illinois, Kentucky, Nebraska and West Virginia all instituted gasoline sales plans. During the natural gas shortages of 1976-77 and the labor disputes of 1977-78, various regions instituted voluntary thermostat reductions, mandatory curtailment of commercial store operating hours, school closings, alternative work schedules, and others.

Since State plans must be approved by DOE, and since DOE can impose the Federal Plan on a state whose plan has been rejected or whose plan is not achieving emergency energy conservation targets set by the President, the States have a strong interest in following DOE's guidance as reflected in the Federal Plan. Unfortunately, the way DOE has developed the plan has not been a model of leadership.

DOE published its interim final plan in February 1980. A few weeks thereafter DOE withdrew the recreational watercraft restriction because of the protest it prompted. One year later DOE proposed withdrawal of 6 of the 8 remaining measures, explaining that they have drawbacks and the free market should function unfettered. It is not clear what the implications of these actions are for approval of State plans. Nearly two years have passed and DOE still does not have a completed plan, nor a process for approving State plans or even a formally designated official other than the Secretary to receive them should any be submitted.

DOE did not closely coordinate plan development with the States. After the EECA was passed in 1979, DOE requested public comments in the Federal Register on December 7, 1979, to be received by December 20, 1979--10 working days. The deadline was later extended to December 27. In spite of the short comment period that fell over the Christmas holiday, a total of 189 comments were received by January 4, and 60 more came in by January 25, 1980.

A breakdown of the origin of the 189 comments is as follows:

Private citizens	95
Businesses	35
Utilities	1
Trade associations	32
Professional associations	3
Federal Government	3
State governments	8
Local governments	11
Universities	1
	189

It is notable that the States, who are supposed to play a primary role in EECA planning, provided only 8 comments.

Given the primary demand restraint role which States are supposed to play under EECA, it is surprising that DOE did not seek to cooperate closely with the States in developing the Plan. When DOE withdrew 6 of the 8 remaining measures and again asked for public comment, DOE stated that the deletions had been made because of negative comments that had been previously received. However, the National Governor's Association and a number of States have expressed concern that DOE's action is limiting their ability to cope with an energy emergency.

Under EECA, the President sets emergency energy conservation targets for each State. The targets depend on the extent of the shortfall and on the ability of other contingency programs to offset it. Since the Federal Government dominates overall contingency planning for oil supply disruptions, it follows that only the Federal Government can identify demand restraint requirements which the various States would have to meet. This being the case, it is essential that the Federal Government provide the States with clear guidance as to levels of demand restraint which State programs should be capable of achieving--including the maximum expected in a worst case disruption. DOE has not provided the States with this necessary guidance.

DOE developed a formula for calculating emergency energy conservation targets and provided a training session to State representatives concerning its application. To test target-setting procedures and as a means of providing on-the-job training to State personnel, DOE established "voluntary" emergency gasoline conservation targets. DOE issued the first targets at the end of 1979 and new targets were regularly set for almost a year. However, both the formula and voluntary targets created problems. Study of the formula revealed a bias. Savings targets were higher for States which had successfully conserved gasoline in the past. The EECA specifies that emergency actions should not interfere with long range conservation, yet the voluntary target-setting

exercise gave the States the impression that they will be penalized for past efforts at gasoline conservation. In addition, some States apparently did not fully understand the purpose of the exercise. They questioned the usefulness of the system, since the targets were so low that they were already being met without any programs being activated.

Another problem in DOE's guidance to the States concerns the savings expected from various demand restraint measures. As already mentioned, DOE's estimates of potential savings from implementing the measures on a national level are not very reliable. Their prospective utility to any State which is trying to decide which measures to include in its plan is further reduced because the estimates are not broken down on a State-by-State basis. If DOE, with the resources of the Federal Government at hand, has experienced great difficulty in overcoming the methodological problems involved in making such estimates, it follows that many State governments would experience even greater problems.

A related problem concerns measuring supply and demand trends for fuels which demand restraint programs are designed to address. In order for the President to set State emergency energy conservation targets at the onset of an oil supply disruption, DOE must know what recent national, regional and State supply (including available inventories) and demand trends are. In order to evaluate States' performance in meeting these targets, as required by EECA, DOE must be capable of monitoring these trends on a very up-to-date (i.e., monthly or even weekly) basis. To accomplish this, DOE must establish and maintain sophisticated data collection systems. Furthermore, EECA requires DOE to collect and publish consumption data for the States.

At the same time, each State needs access to comparable information for both itself and its region. States need to know both the recent and forecast supply-demand trends to decide which demand restraint programs to implement. They also need to be able to monitor the performance of their programs so that they can make necessary adjustments.

States are not capable of establishing fully adequate data systems, since they frequently depend on companies outside their borders for supplies. In addition, supplies held by companies within a particular State are often destined for other States. It would also be redundant and wasteful for States to establish duplicative systems. For all these reasons, and because DOE has spent years developing sophisticated data systems, it makes sense for DOE to make relevant data available to the States for their demand restraint planning and program implementation.

DOE indicated to the States that it was prepared to do so, and planned to provide States with access to DOE computers, so that States could directly access DOE data files for their contingency planning purposes. However, these actions have not been taken. According to a DOE official, one reason why is that much

of the data is proprietary and State governments have not established secure facilities for protecting it. Making data available under such conditions is prohibited by law. Another reason offered by the same DOE official is that the various States have never clearly told DOE what their data needs are, even though DOE has invited them to do so.

In any event, most States do not have adequate data systems to fulfill their demand restraint responsibilities under EECA. Moreover, even though DOE has superior data systems, DOE officials told us that these are inadequate for monitoring how well the States' plans are working. Because of this, they told us that successful demand restraint in a supply interruption will hinge upon whether the States have workable plans and programs.

Since EECA was passed in 1979, both State and Federal demand restraint programs have received little funding. The first funds were not appropriated until July 1980--almost 9 months after the law was passed. The law required DOE to prepare a plan within 90 days but no money was appropriated for this purpose. The law also asked the States to begin work on their plans but funding was not provided. The Office of Emergency Programs requested $14 million: $10 million for grants to the States and $4 million for operations. In July 1980, the office received 10% of the request--$1.4 million. Money for State grants was expressly denied. Without funding, some States indicated that they would not cooperate with the program.

A request for reprogramming of $2.7 million of DOE funds for demand restraint purposes was submitted toward the end of FY 1980 but then withdrawn. The Office was expecting FY 1981 funding to total $10 million, including grants for the States. This was indicated by the fact that letters were sent out to the State energy offices (with copies to State Governors) telling them how to apply for grants, and all of them did so. However, the new administration cut FY 81 funding to $2 million to cover maintenance expenses only. For FY 1982, DOE may again receive $2,000,000 for technical assistance and program management. No monies have been requested for grants to the States.

In the administration's 1982 budget proposals, both long range energy conservation and emergency planning funds for the States would be eliminated. GAO testified before the Subcommittee on Energy Conservation and Power, House Committee on Energy and Commerce on May 28, 1981 that:

> "The immediate loss of Federal funds may cause some States, because of budget constraints or requirements to eliminate State energy offices, resulting in a loss of this management and coordination capability at the State level. This loss would also affect States' growing responsibilities in emergency response planning activities."

STATE DEMAND RESTRAINT PLANS ARE NOT READY

Standby demand restraint programs do not exist to any appreciable extent, and demand restraint planning is not a priority activity. This should come as no surprise in view of the problems discussed in preceding sections.

Nearly two years after EECA was adopted, only three States have submitted plans to DOE for preliminary review. A DOE survey of the States conducted in 1980 found that most States had begun some kind of plan. However, representatives of State organizations who testified before the House Environment, Energy and Natural Resources subcommittee in September 1980, indicated that the "planning" was not really significant--that most States were not really working on plans and would not do so until Federal funds were made available. DOE sources say that if an emergency were declared tomorrow, the States would not be able to prepare plans within the 45 days allotted.

All in all, there does not appear to be a bona fide Federal demand restraint contingency plan, and what exists probably is not workable at the Federal level. It is possible that the States might be able to institute programs if an emergency occurred. It is possible, but not probable.

RECREATIONAL WATERCRAFT RESTRICTIONS:

A CASE STUDY OF POOR DESIGN AND SELLING OF DEMAND RESTRAINT

Greater coordination between the Federal Government and industry may not only increase potential saving, but may also facilitate acceptance. This section illustrates the consequences of a poor design and "selling" of a demand restraint measure. Specifically, Recreational Watercraft Restrictions--a short-lived demand restraint proposal, is analyzed.

Restrictions on recreational watercraft use was one of four emergency conservation measures proposed for inclusion in the Federal Plan and published in the Federal Register in February 1980 for comment. The proposed rule banned operation of private recreational motorboats on Sundays or possibly during the entire weekend. The Department of Energy estimated that a Sunday restriction would have reduced recreational motorboat use by ten to fifteen percent per week. A total weekend ban was estimated to bring a thirty five to forty percent reduction in recreational motorboat use. The total annual fuel savings for the former ban was estimated at 35 MBD and 85 MBD for the latter. 1/

DOE justified the proposal on two grounds. First, recreational motorboats purportedly consume a significant amount of motor fuel. As indicated by a U.S. Coast Guard study, recreational motorboats will consume 220 MBD of motor fuel in 1981, two to three percent of all motor fuel consumed. 2/ Second, the measure would also be "symbolic," illustrating that motor fuel should not be spent on recreational or discretionary travel during an emergency. Other recreational vehicles--snowmobiles, four wheel drive vehicles, dune buggies and general aviation aircraft--were not included because banning their use would bring insignificant further decreases in fuel demand. Also, the difficulties and costs incurred in implementing and enforcing such restrictions would be disproportionate to any benefits received.

The proposed measure was vehemently opposed by the boating industry. The main participants included: individual boaters, sportsmen, small business owners, corporate agents, representatives of boating and marine rescue workers, and industry and magazine spokesmen. Their main grievances centered around two issues: the validity of the fuel consumption figures cited by DOE and the proposal's apparent inequity.

1/Federal Register, Volume 45, No. 27, February 7, 1980, p. 8485.

2/U.S. Coast Guard, Recreational Boating in the Continental United States in 1973 and 1976: The Nationwide Boating Survey CG-B-003-78, March 1978.

DOE obtained most of its statistical data from the study commissioned by the Coast Guard and a study conducted by the Massachusetts Institute of Technology based on the Coast Guard study. 1/ The former study states that in 1976 there were 8,740,000 motorboats with a total fuel consumption of 3,071,290,000 gallons. Therefore, the average number of gallons of fuel used per boat was 351. It was from these figures that the Department of Energy extrapolated the three percent figure, the maximum amount of the nation's fuel to be consumed in 1981 by recreational boating.

In May 1979 the Boating Industry Association published a report stating that recreational boating consumes less than 900 million gallons annually constituting less than one-half of one percent of all the gasoline sold in the United States. 2/ Its estimate of the annual fuel consumption per boat was 112.5 gallons.

These studies were at opposite ends of the spectrum. In formulating the proposal, DOE did not consult other timely and readily available studies or solicit information on fuel consumption from boating industry officials. For example, a report prepared for the Department of Transportation estimated annual fuel consumption per boat to be 179 gallons. 3/ This is approximately one-half of the U.S. Coast Guard's estimate. Furthermore, a study for the Department of Energy conducted by Booz, Allen, and Hamilton, Inc., estimated the annual fuel consumption per boat to be 272 gallons, constituting a 79 gallon difference. 4/ What is important to note is that many authoritative reports with varying estimates were not considered by DOE.

The second major complaint voiced by the boating industry concerned the measure's equity. As was previously mentioned, DOE stated that boating is a highly visible activity and its abatement for one or two days would serve an "important symbolic purpose." As can be expected, industry representatives objected to their being targeted as the "sacrificial lamb" in the event of an energy shortfall, especially when such a conclusion was based upon questionable statistical data.

1/U.S. Coast Guard, op. cit., p. V-22, Authorities, Need, Rationale, Operation, Massachusetts Institute of Technology, Center for Transportation Studies, July 31, 1979.

2/Recreational Boating Energy and the Economy, Boating Industry Associations, May 1979, p. 1.

3/Energy Conservation Potential of Recreational Boating Activity, Jack Faucett Associates, Inc., October 1979, p. 51.

4/An Energy Study of the Marine Transportation Industry, Booz, Allen and Hamilton, Inc., June 1978, p. VIII-3.

The boating industry employed various methods to oppose its apparent "targetting" by the Department of Energy. The Washington council for the National Marine Manufacturers' Association (NMMA) took action by filing a law suit against the Department of Energy. The Emergency Energy Conservation Act states that no Federal energy plan taken as a whole should be designed to impose an unreasonable share of the energy conservation burden on a single class of industry, business or commercial enterprise. The boating industry contended that the proposed restrictions were blatantly illegal.

Detailed information was not made available to industry representatives until shortly before the proposal was published in the Federal Register in February 1980. News of the measure's proposed inclusion in the Plan was received approximately one to one and a half weeks before publication. The information was obtained mainly through press reports. DOE was contacted and attempts were made to schedule meetings in order to obtain a more comprehensive explanation. DOE denied these requests.

Public hearings were scheduled to be held in six cities during March. All written comments had to be received by April 7, 1980. Therefore, the industry had 55 days between the Federal Plan's publication and the April 7, 1980, deadline for public comment to mobilize against the proposed restrictions.

Boating industry associations such as the NMMA, the Marine Retailers Association of America, and the National Boating Federation quickly informed their membership by means of telex and telephones. Subsequent newsletters also provided detailed information. All other interested parties were made aware of the situation through the print and electronic media. NMMA members, for example, were mailed copies of the Federal Register containing the schedule of public hearings and were encouraged to attend.

Given the limited amount of time, the association members protested the proposal by writing to DOE and their representatives and testifying at the public hearings.

Between February and March 1980 the Department of Energy was bombarded with approximately 56,000 letters and thousands of telephone calls opposing the measure. Meetings between industry representatives and DOE officials also took place. At these meetings industry officials discussed the devastating effects such restrictions would have on the industry. One of the complaints involved television coverage which conveyed the false idea that weekend boating was being banned immediately.

The proposal was made public at a most inopportune time for the boating industry. It occurred at the beginning of the boating season, the "fitting out season." Industry officials stated that sales generated through boat shows and exhibitions decreased by 30 percent ($450,000,000) with a permanent loss of 100,000 employees

out of a work force of 600,000. The industry also stated that one thousand retailers were driven into bankruptcy.

A cross-section of the restriction's opponents was present at the hearings on the Standby Federal Emergency Energy Conservation Plan. Although the hearings were designed to hear testimony on the entire nine point program, the opening hearing in Atlanta, Georgia, was dominated by those protesting the weekend watercraft restriction. In the first two days of hearings thousands attended and 75 individuals testified against this aspect of the program.

Remarks by DOE officials during the opening hearing indicated that industry arguments were apparently effective. Henry Bartholomew, DOE's Director of the Office of Emergency Conservation, stated that "My personal opinion is that by the middle of April, it should have been withdrawn." 1/ Further conciliatory statements were made during subsequent hearings. They included comments on the enactment's discriminatory nature and the questionable supporting documentation. On April 21, the proposed measure was withdrawn.

One reason for widespread opposition to the measure and its eventual withdrawal was the almost total lack of interaction between the Department of Energy and the boating industry. Several boating industry officials we contacted commented that the Government should have consulted the industry during its development. They contended that DOE would have obtained more realistic data on the level of recreational motorboat fuel consumption and would have been made aware of the fuel efficiencies developed within the industry.

One official commented that if restrictions did indeed have to be imposed upon the entire recreational vehicle industry, cooperation between the government and the boating industry would have made them more palatable. Regarding alternatives, one industry official proposed a sticker system whereby individual boaters would agree not to use recreational watercraft on one or two weekend days per month. The official felt that this coupled with other demand restraint measures, such as an automobile sticker plan, would probably achieve the desired fuel savings targets. Thus, a coordinated effort between DOE and the industry could result in the design of more compatible fuel savings plans.

It should be noted that other officials in the recreational boating industry were totally opposed to any type of governmental regulatory mechanisms. The free market mechanism was advocated as the best regulator.

As was indicated in the Federal Register and by the testimony presented at the various public hearings, a number of

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1/Soundings, April 1980, XVII, No. 11, p. 4.

legitimate objections were presented. Rather than address the problems raised, DOE chose to withdraw its proposal. Cooperation before and after the publication deadline on the part of DOE with the boating industry might have resulted in the development of a more equitable and viable measure.

CHAPTER VI

ALLOCATION AND RATIONING

Crude oil allocation was first instituted during the 1973-74 oil embargo as was petroleum product allocation. These programs remained in force until early 1981. DOE substantially revoked them on April 3, 1981, as a result of the President's Executive Order 12287 of January 28, 1981, which exempted crude oil and refined petroleum products from price and allocation regulations. The authority for general domestic allocation is still on the books, but will expire on September 30, 1981, unless extended by congressional action.

A gasoline rationing plan was approved by Congress during the summer of 1980. However, the Administration stopped planning program implementation when it rescinded planning funds. Since start up would take 3 months, even after a 12-month planning period, the suspension of this process essentially removes coupon rationing from the Nation's defenses against disruptions. Like allocation programs, authority for gasoline rationing also expires on September 30th.

CRUDE OIL ALLOCATION

Authority for general domestic allocation will expire with the expiration of EPAA on September 30, 1981. This statute provided authorization for two crude oil allocation programs, a mandatory and a standby mandatory program. The standby mandatory program was designed to cope with significant oil market disruptions. DOE substantially revoked both programs on April 3, 1981, as a result of the President's Executive Order 12287 of January 28, 1981, which exempted crude oil and refined petroleum products from price and allocation regulations.

Background: The Regular and Emergency Programs

The 1974 regulations adopted by the Federal Energy Office (FEO, later the Federal Energy Administration, FEA) froze all supplier/purchaser relationships for domestically produced crude oil as of December 1, 1973. In addition, the regulations mandated certain sales of crude oil from one refiner to another so as to equalize access to crude at the national average supply-to-capacity fraction for all refiners. FEO calculated the fraction on the basis of refinery capacity and estimated crude oil supplies (including current stocks and projected crude oil deliveries) during a 3-month allocation period. Suppliers and purchasers under the program were free to negotiate a price for the transaction not to exceed the weighted average price of all crude delivered to the seller during the allocation period including transportation, crude quality differentials, and a small landing fee.

After the embargo was lifted in the spring of 1974, the FEO began to reduce the scope of the program to reflect the return of more normal supplies. In May 1974, the 15 "major" refiners were

eliminated from eligibility as buyers under what was now known as the "Buy/Sell" program. 1/ Buy/Sell required these 15 to sell designated amounts of crude oil to small and independent refineries in proportion to the majors' share of total refinery capacity. In 1976, the FEA amended the pricing provisions to eliminate the advantages of purchasing under the program: the maximum price was tied to the refiner-seller's weighted cost of imported crude oil (excluding Canada). In October 1977, FEA further reduced the scope of the Buy/Sell program to limit purchases to those refiner-buyers who were demonstrably short of crude oil.

Under the emergency provisions of Buy/Sell, small and independent refiners that were ineligible for the basic program could become eligible if their crude oil supplies were reduced by 25 percent or more. Following the disruption of the world petroleum market in 1979, the emergency provisions of Buy/Sell were liberalized to accomodate small and independent refineries that lost access to regular crude supplies because of cutbacks in contracted deliveries. Such refiners could be eligible for allocations under the program by demonstrating an inability to replace lost supplies at prices comparable to those paid for crude oil of comparable quality purchased on the world market. At the same time, DOE proposed to enlarge the universe of designated sellers from 15 to 22, including all refineries with more than 175 MBD of capacity. The additional 7 were not considered "major", but were added to spread the burden of the program more equitably. 2/

The Standby Program

The Standby Mandatory Crude Oil Allocation Program, designed to cope with significant oil market disruptions, has gone through several phases. The most recent was adopted in January 1979, and consists of three options, two of which incorporate features of the regular Buy/Sell program. The major differences between the regular and standby crude oil allocation programs are the allocation formula, the classes of eligible refineries, and the pricing provisions. The Administrator of DOE's Economic Regulatory Administration (ERA) has the discretion to implement the separate options in phases depending on the severity of the shortage.

1/The "Majors" included Exxon, Mobil, Texaco, Chevron, Gulf, Amoco, Arco, Shell, Conoco, Tenneco, Sun, Phillips, Occidental, Union and Sohio.

2/For further details on 1979 oil market conditions, see GAO "Iranian Oil Cutoff: Reduced Petroleum Supplies and Inadequate U.S. Government Response" (EMD-79-97, September 13, 1979) and "The United States Exerts Limited Influence Over the International Crude Oil Spot Market" (EMD-80-98, August 21, 1980).

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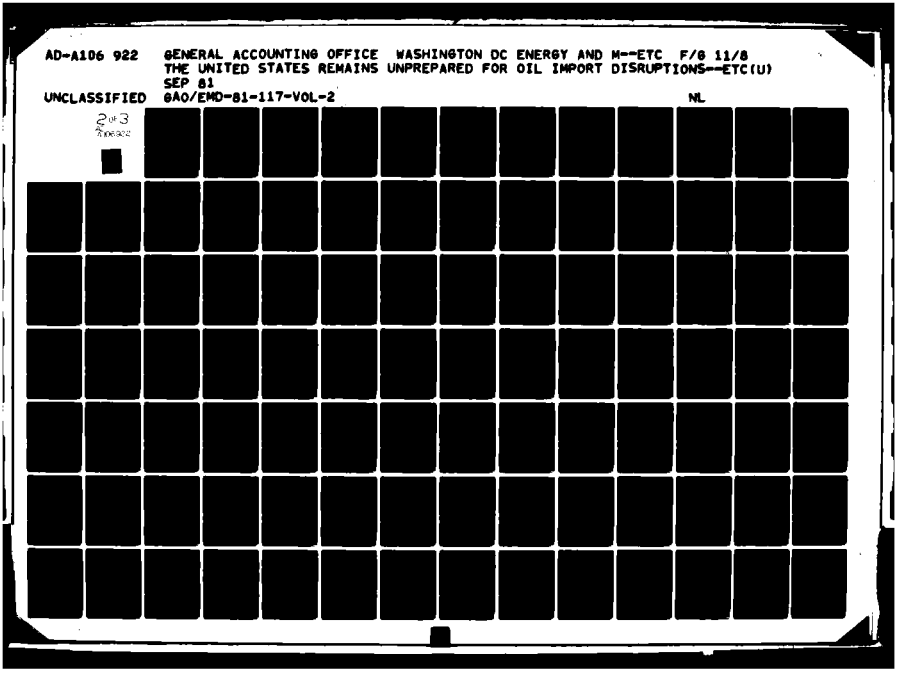

OPTION I - ERA would grant emergency supply under the Buy/Sell Program to any refiner with a significant shortfall in crude oil supplies. Refiner-sellers would include all 22 large refiners (majors and independents). Refiners with less than 50 MBD capacity would pay the sellers' average weighted cost of imported crude as in the regular program. For refiners between 50-175 MBD capacity price would vary between the average weighted price and the actual acquisition cost to the seller as determined by ERA.

OPTION II - ERA would implement standby provisions only for major and large independent refiners, using the regular program for small refiners (with less than 50 MBD capacity). Under this option, small refiners would pay seller average weighted costs while large refiners would pay actual acquisition costs. Refiners with 50-175 MBD capacity would pay either average or actual costs to be determined by ERA.

OPTION III - The regular program would be completely eclipsed by the standby provisions. All refiners would be subject to the same allocation formula. However, refiners with less than 50 MBD capacity would be exempted as sellers if the total reduction in U.S. crude supplies were 7 percent or less. Such refiners would pay average weighted costs for crude purchases under the program; all others would pay actual acquisition costs.

Oil shortfall offset

The Standby Mandatory Crude Oil Allocation Program is not designed to increase supply or reduce demand for oil products during a supply disruption. However, DOE has attempted to present the program as a demand restraint initiative to comply with the requirements of the International Energy Program of the International Energy Agency (IEA). According to DOE officials, the IEA defines demand restraint broadly to include all forms of "crisis management" including allocation programs.

While the IEA may indeed accept the program as one which restrains demand, the argument that crude allocation actually does so is pure sophistry. Rather, it forces demand to adjust to lower supplies. Mandatory crude allocation may even marginally reduce product supply by lowering the amount of oil going to the larger, more efficient refineries.

International coordination

Section 251 of the Energy Policy and Conservation Act of 1975 (EPCA) authorizes the President to take necessary actions to implement U.S. obligations under the International Energy Program (IEP) relating to the mandatory allocation of oil. (For a discussion of the IEP and allocation see Chapter VII.) The Standby Mandatory Crude Oil Allocation Regulations provided for the activation of the standby program when the IEP is activated, unless determined otherwise by the Secretary of Energy.

Given the likelihood that the two programs would be implemented concurrently, DOE provided for the integration of standby domestic programs with the Emergency Sharing System of the IEP. Buy/sell rights and obligations under the standby program would be adjusted to reflect purchases or sales made by U.S. refiners pursuant to the IEP allocation. To accomplish this purpose the regulations provided that IEP-designated U.S. reporting companies simultaneously transmit their IEP allocation offers to ERA. Within 48 hours, DOE would notify the IEA as to whether the IEA's acceptance of an offer would impair the operation of U.S. domestic allocation programs. If this was determined to be the case, the IEA would consider adjusting its allocation order.

In its April 3, 1981, action, substantially revoking crude oil allocation programs, DOE left in place certain standby mandatory domestic allocation and pricing regulations. These regulations provide for the pricing and allocation of crude oil which may be necessary, due to a severe energy shortage, to carry out U.S. obligations under the IEP. DOE's General Counsel recently advised us that these regulations will continue in effect after September 30, 1981, the expiration date of EPAA, since they are also authorized under Section 251 of EPCA. GAO is presently examining DOE's authority to use Section 251 to establish such a domestic allocation program.

Program readiness

In 1979 and in early 1980 the emergency provisions of the regular program were activated in response to the Iranian shortfall. Under these provisions DOE increased allocations from an average of about 20 MBD in 1978 to about 300 MBD in the fourth quarter of 1979. Certain large refiners sued DOE, claiming that their purchases of high-priced crude, required to meet their obligations under the program, were not fully compensated under the pricing provisions of the program. However, the program did supply certain small refiners which would have otherwise been unable to obtain sufficient crude to run their refineries or would have been completely dependent on the spot market for supplies.

The standby mandatory crude oil allocation program has never been invoked during an actual crude oil shortage. However, portions of the proposed regulations were subjected to a simulation test in April, May and June of 1978. The test was performed concurrently with, although independently of, the IEA's second allocation system test. The primary purpose of the standby program test was to determine how effective the proposed allocation system would be, develop data systems to monitor the program, and identify possible deficiencies or shortcomings.

DOE pronounced the program "sound and workable" on the basis of the Spring 1978 simulation exercise. However, this judgement was not unanimous among DOE officials responsible for administering the test and monitoring the results. Moreover, many important components of the standby program including the pricing provisions, actual exchanges of crude oil among refiners,

deadlines for filing data and completing transactions, directed sales and product importer allocation provisions were not tested at all.

Despite the lack of definitive test results, DOE officials told GAO that the standby crude oil allocation program was in "super shape" and as "ready (for implementation) as it will ever be." However, serious problems with the program have become evident both in the simulated test and in public hearings held by ERA during the last two years. Some of these problems have been addressed by DOE; others have not.

Program weaknesses

Each of the three standby options summarized above contain weaknesses that threaten to overwhelm ERA's capacity to administer the program and undermine the goals of efficient and equitable allocation of crude oil to refiners.

Under the first option, DOE would grant emergency allocations under the regular Buy/Sell program to all refiners with significant shortfalls in crude oil supplies. Under certain circumstances, this option could result in a huge increase in the number of applications for emergency allocations, each of which requires a detailed examination of the applicant's crude oil supply, including crude oil acquisition costs in relation to cost for similar types of crude oil on the world market. During the 1979 disruption for example, ERA limited the number of eligible applications to those who could demonstrate a 25 percent or greater shortfall in crude oil supplies. Without this limitation, the administrative burden of reviewing up to 300 emergency applications per quarter would have crippled the standby program's ability to meet its objectives. DOE has also acknowledged that by expanding the class of eligible small refiners, many of whom operate less efficient refineries, standby Option I could result in the use of inefficient refineries--a result which does not serve the national interest. DOE has also noted that increasing the number of eligible buyers without enlarging the universe of sellers above the 15 majors places a disproportionate burden on the majors and benefits the large independents.

Standby Option II would implement the standby regulations for the 22 major and large independent refiners while using the regular Buy/Sell program to supply small refiners. Under this option (as well as Option III), large refiners would be permitted to purchase through normal commercial channels enough crude oil to run their refineries at the National Utilization Rate (NUR). If a refiner had more crude oil than dictated by the NUR, he would be required to sell the excess to a refiner without enough crude to reach the NUR. With respect to this option, DOE has acknowledged that requiring refiners to sell all the crude oil they acquire above a given amount would reduce the refiner's incentive to seek additional crude.

The use of the acquisition cost pricing mechanism in sales to refiners with greater than 50 MBD capacity is subject to two particular drawbacks during a worldwide crude oil supply shortage.

While pricing allocated crude at actual costs provides an incentive for the refiner-seller to acquire incremental volumes of crude on the world market, it does not create any incentive to seek the lowest possible price for incremental supplies. This lack of incentive could be a source of upward pressure on spot prices and could reduce the value of the program to eligible buyers.

DOE acknowledged the above criticisms of the standby mandatory crude oil allocation program, and on November 26, 1979, prepared amendments designed to address them. Following a public hearing on December 13, 1979, however, DOE decided not to adopt any of the recommended changes.

In addition to these criticisms of the regulatory framework of the program, several operational problems observed in the Spring 1979 simulation test have not been addressed. These include:

--late submission of ERA-59 reports,

--refiners' confusion between regular and standby programs,

--refiners' confusion between the international (IEP) and domestic allocation programs, and

--refiners' difficulty in projecting future supplies due to the uncertain status of exchange agreements during a disruption.

In summary, deficiencies in the standby crude oil allocation program have never been corrected. Furthermore, authority for general domestic allocation regulations will expire by October 1981, unless extended by Congress. DOE recently advised GAO that regulations for the domestic allocation of oil to carry out U.S. obligations under the IEP will continue in effect after September 30, 1981, the expiration date of EPAA. GAO is presently examining DOE's authority to use Section 251 to establish such a domestic allocation program.

The Cabinet Council on National Resources and Environment recently recommended to the President that the administration should oppose enactment of some form of petroleum regulatory authority for essential emergency services to replace EPAA when it expires at the end of September 1981. Concerning our international sharing obligation, it recommended development of a plan, based on EPCA authority, for fair sharing among U.S. oil companies which the President could use if he deemed it necessary to meet our obligations. At about the same time DOE issued a report stating that it plans to develop a contingency plan for a limited crude oil "fairsharing" system to backstop voluntary offers, for activation should the President deem it necessary to meet our international obligations. The aim of this system will be to assure U.S. oil companies that the burden of supplying oil to the IEA sharing system will be shared equitably, if necessary through

government ordered transfers of crude oil among them. It will be a very narrow system in order to minimize adverse effects on market decision-making and efficiency.

However, until such a system is developed and in-place on a standby basis, the U.S. ability to effectively meet IEP obligations, should they arise, will not be assured.

PRODUCT ALLOCATION

Until January 1981 when the regulations were suspended, gasoline allocation was the only program which could have been used to distribute supplies during shortfalls of less than 20 percent. Yet, during the 1979 gasoline shortage the program failed to meet its intended objectives. In 1980 GAO concluded that the program was so seriously flawed that a major overhaul was needed before better results could be expected. 1/

Following the Arab Oil Embargo, the Congress provided legislative authority to deal with energy shortages and to assure sufficient supplies to priority users and equitable distribution of supplies nationwide. This authority will expire by October 1981 unless extended by the Congress. The Department of Energy was responsible for satisfying these legislated objectives by its allocation program. Individual States played a key role in the program's implementation.

How the program is supposed to work

The regulations affect the entire gasoline distribution system, from the refiner to wholesaler to retailer and bulk end user. Basically, gasoline allocations are determined by reference to a historical base period. Suppliers must offer to sell to the same buyers who bought during the base period, although these buyers are not obligated to take the gasoline. The amounts purchased during the base period (base period volumes) are used to determine the quantity to which buyers are entitled. Certain national defense, agricultural, and other uses are given priority in receiving gasoline. The remainder is allocated to nonpriority buyers as a fraction of the base period volume.

Each prime supplier (a refiner or wholesaler who first transports gasoline into a State) generally must use a uniform allocation fraction nationwide to distribute gasoline, unless DOE directs or approves the use of a different fraction for a particular region. In addition, a "set-aside" program permits States to direct the distribution of a portion of the gasoline to meet hardships and emergencies within that State. Each prime supplier must set aside 5 percent of supply for this purpose.

1/See U.S. General Accounting Office, "Gasoline Allocation A Chaotic Program in Need of Overhaul," (EMD-80-34, April 23, 1980) for a full discussion of the 1979 shortfall experience.

Firms can request an exemption from the regulation or appeal a decision of DOE through DOE's Office of Hearings and Appeals.

The 1979 allocation experience

When the Iranian oil shortfall of 1979 hit, DOE was not prepared to effectively implement its gasoline allocation program. DOE had failed to revise and update its program, and as a result, the Department was forced to make numerous program modifications, revisions, and updates between February and August 1979 during the course of the shortage. The frequency of changes and their immediate implementation caused significant problems. The industry found it difficult to comply with the changes and DOE field offices had difficulty retraining staff and dealing with the increased workload.

The changes were made without benefit of regulatory analyses, often without public hearings, and with minimal time for written comments from interested parties. This ad hoc approach also forced DOE to make its decisions based on limited information, and invited further changes.

Our audit of the following year characterized the program as "chaotic" and specifically found that:

--emergency response planning was incomplete and outdated.

--Federal and State Governments were ill-prepared to deal with their supply management roles.

--DOE's program operations were plagued by inadequate management and staffing, relentless demands for services, poor or totally lacking information systems, and unclear guidance and direction.

--DOE's problems were mirrored in the States' set-aside programs. Like DOE they had not prepared to deal with the sudden workload, and also were handicapped by the absence of clear definitive guidance.

--DOE's audit activities were belated and of mixed success. These audits and the work GAO performed encountered a high incidence of possible violations of allocation program regulations.

Despite these shortcomings of the present program, GAO favored efforts to make allocation an effective tool. The program has not yet had a "fair" test. After it was established in 1974 it was not significantly revised until the midst of the 1979 gas shortage; and even those revisions were "quick fix" remedies.

As Chapter XII makes clear we need a standby emergency oil supply assurance program to deal with disruptions. What is needed, however, is a simpler, more flexible program which does not include

price control. Alternative distribution systems are discussed in Chapter XII of this volume and Chapters III and V of Volume I.

GASOLINE RATIONING

The Emergency Energy Conservation Act of 1979 amended the Energy Policy and Conservation Act and required the administration to submit a gasoline rationing plan to Congress (in addition to the one that Congress turned down in May 1979). That plan was submitted in June 1980, and effectively approved the following month. Authority for gasoline rationing, and hence the plan, will expire on September 30, 1981.

As adopted, the Standby Gasoline Rationing Plan is an emergency measure designed to distribute the effects of a gasoline shortage on a basis other than price alone. Its two primary aims are: (1) efficiency--that essential needs, such as agriculture and emergency services, be met; and (2) equity--that by and large, motorists in each state incur the same percentage reduction in gasoline. In the event of a 20 percent shortfall and the implementation of the rationing plan, the Department of Energy calculates that priority users would receive 90 percent of their base period use, firms and businesses 80 percent, and individual motorists 70 percent. On these calculations, most private Americans would receive about 42 gallons per month per vehicle.

Summary of the rationing plan

The total amount of ration rights to gallons of gasoline would be calculated for each state based on a formula taking account of the historical use of gasoline in that state. Within each state, individuals with validly registered motor vehicles would receive an allotment for each vehicle. The number of allotments would be limited, probably to 3 per household. Local rationing offices would be set up to give supplemental allotments to hardship cases. These hardship allotments would be governed by guidelines developed cooperatively by Federal, State and local governments. Businesses would also receive supplemental allotments to maintain their operations, as would governmental units and other organizations providing essential public services. 1/

1/Priority activities currently identified in the plan are: (1) emergency services, which include law enforcement, fire fighting, emergency medical services, snow removal, telecommunications services, utilities services, search and rescue operations, and the U.S. Postal Service, (2) sanitation services, (3) public passenger transportation, including taxicabs, (4) the Department of Defense, with respect to its activities directly related to the maintenance of national security, (5) agricultural production, processing, and distribution, (6) for-hire mail and small parcel transportation and delivery, (7) energy production, (8) short-term vehicle rental, (9) newspaper distribution.

With the exception of agriculture, allotments for these priority activities within each state would be deducted from the State's total allotment. Agricultural allotments would be deducted from the total available nationally before distribution is made to the individual States. This treatment of agriculture avoids very small allotments to other categories of end-users that might result from the size of the agricultural priority category in highly agricultural States.

Other significant aspects of the plan deal with:

--Reserves

-State Ration Reserves would be established for use by State and local offices in issuing hardship allotments. States would have considerable discretion in the use of their ration reserves, subject to general DOE standards and guidelines.

-DOE would establish a national ration reserve to meet national disaster needs and to provide allotments to Canadian and Mexican firms that use their vehicles to do business in the U.S.

--Issuance of ration allotments

-Ration allotments would be issued in the form of government ration checks, which could be exchanged for ration coupons at designated coupon issuance points.

--Coupons

-DOE would enlist the participation of qualified organizations to issue coupons. These organizations would be supplied with coupons by DOE and would serve as ration check "cashing" points for check recipients.

-Coupons would be distributed in series with the date when each series becomes valid. Coupons would be valid until the end of the rationing program.

--Ration banking

-Individuals and organizations that use large quantities of gasoline could open ration banking accounts at participating ration banks.

-Account holders could deposit valid coupons or ration checks to their accounts and write ration checks against their accounts.

--Ration rights market

-DOE would permit the sale or transfer of ration rights. DOE would impose no price or other controls on this market except as may be necessary to prevent abuse or disruption of the rationing program.

-DOE would provide for the dissemination of information on the price and availability of ration rights in the market.

-DOE would have the authority to buy or sell ration rights in order to maintain an ongoing balance between the number of ration rights outstanding and the supply of gasoline and to ensure the availability of ration rights where needed.

Rationing plan status

Pre-implementation

The plan was in the pre-implementation (planning) stage until recently. In order to bring the plan to a state of operational readiness, pre-implementation called for two consecutive actions:

--developing and instituting a detailed plan for managing the entire pre-implementation effort, and

--completing 16 specific pre-implementation tasks. 1/

The Department of Energy hoped to complete the pre-implementation phase within one year, but the administration's decision not to continue funding and to not seek renewal of authority for rationing have put pre-implementation in limbo.

Implementation

In order to implement the rationing plan, the President must determine that this action is required by a severe energy interruption or is necessary to comply with obligations of the United States under the International Energy Program. EPCA sec. 201(d) defines a severe shortage as a 20 percent shortfall likely to last 30 days or more and one which is not manageable under other

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1/These tasks address allotment planning, ration check production, national vehicle registration file, ration check issuance and reconciliation, coupon production, coupon distribution, ration banking operations, Federal organization, State and local roles, allocation program interface, ration rights, market operations, adjustments and appeals, audit and enforcement, management information systems, public information and readiness maintenance.

emergency authorities. The shortage must be expected to have a major adverse impact on national health or safety, or on the national economy. An obligation arising out of the International Energy Program must have comparable adverse implications. In enacting the authority for the standby Gasoline Rationing Plan, the conference committee recognized that in an emergency, data may be imprecise and that the determination of a 20 percent shortfall is likely to require "a high degree of judgement and the exercise of discretion." If the administration is unable to affirm with certainty that the shortfall will reach the 20 percent trigger, the President may, nevertheless, request implementation of the plan, subject to approval by both houses.

Unanswered Questions

Equity--The Standby Gasoline Rationing Plan attempts to distribute the effects of a gasoline shortage equitably on a State-by-State basis. That is, motorists and other gasoline users in one State are expected to experience about the same relative reduction in the amount of gasoline available to them as users in another State even though normal or historic consumption in these States varied widely. This result is achieved by (1) basing the distribution of ration rights among the states on the basis of gasoline use in the most recent base period and for businesses on historic use, and (2) deducting agricultural allotments from the total national allotment before distribution to individual states. If this second provision had not been made, non-agricultural users in heavily agricultural states would have received significantly smaller shares, because of the size of the agricultural priority category.

However, intra-state differences in gasoline use may well be as great as those found among the States. Thus, intra-state inequities in heterogeneous States like California, New York or Texas might be greater, and hardships greater, than among States. The plan does not address this problem. Instead, it makes provisions for States' Ration Reserves to be established in each state for use by State and local offices in issuing hardship allotments. States will be given considerable discretion in the use of these reserves, subject to general DOE standards and guidelines. DOE proposes that the responsibilities of State and local governments for allotment distribution will increase commensurate with their capacity and willingness to undertake these tasks and that the percentage of the state's allotment set aside be increased accordingly.

Price control and continuing allocations--By implication the imposition of rationing implies some form of price control. If the price of gasoline were simply allowed to rise to a market clearing level, the limited supply would be distributed on the basis of price, an alternative rationing is designed to avoid. In fact, ration coupons and rights are expected to trade freely on a "white market" and their price when bought or sold will represent the difference between the base price of gasoline and the market clearing price for the amount sold on the white market.

It is difficult to see how a base price can be maintained without some form of controls and allocations by DOE.

Diesel fuel--Diesel fuel has been excluded from the present plan, because it is interchangeable with home heating oil. The Department considers that compliance with diesel fuel rationing could be enforced only at intolerable costs. DOE had intended to undertake a further study of this issue before the recent change in administration.

Timeliness--If the rationing plan were fully pre-implemented DOE officials estimated that mobilization--that is, the period between the President's proclamation of an emergency and implementation--would take three months. This interval is longer than the time it would take for a physical shortage to take effect as a result of consumption of normal stockpiles and receipt of oil in transit. Concrete steps might be necessary well in advance of that, however, to avoid immediate reactions such as hoarding in anticipation of a physical shortage. The gasoline product allocation program would presumably be imposed to deal with this problem.

Workability of the rationing plan--One element crucial to the success of rationing is matching the distribution of both ration coupons and gasoline. There was no system contemplated which would have guaranteed that initial distribution of gasoline and coupons would match. Moreover, allocation is likely to be imperfect, and the rationing plan calls for the free transfer of ration rights. Therefore, the allocation system must provide a mechanism for supplies to "chase" demand in the form of ration rights or coupons actually used. Another problem is that rationing would be based on historical use patterns. But during a disruption, use patterns may be radically different. Here again there is every reason to suspect that gasoline may not be available where the coupons are.

The information upon which the distribution is to be based may be difficult to obtain on a timely basis. A data base including State motor vehicle registration files is called for during implementation, but has been suspended. Furthermore, it may contain up to 20 percent errors. There is also the question of whether priority and business users will be preregistered, and if not, how much delay will be caused by the need to establish their entitlement to ration rights.

Budgetary and private costs of rationing

DOE has estimated the pre-implementation, readiness maintenance, mobilization, and operator costs of rationing. By its calculation, pre-implementation would have probably cost $130 million. The largest components include the following:

	Estimated Costs ($ millions)
--Ration check issuance and reconciliation and national vehicle registration file	21.0
--Management reserve	20.0
--Coupon production (5 billion new coupons)	18.0
--State and local roles/ functions	10.9

Preliminary DOE estimates of the annual cost of readiness maintenance range between $25 and $39 million. Mobilization costs will cover the period (90 days or less) from the time when rationing is authorized until it actually starts. These are estimated at $463.8 million with coupon distribution ($116.5 million) and State and local roles/functions ($202.6 million) the largest components. Once rationing is in effect, DOE estimates quarterly costs at $474.4 million, made up primarily of coupon distribution ($132.4 million), banking operations ($101.5 million), and State and local roles/functions ($134.3 million).

The private sector will also experience costs. Most of these will be the result of the shortage itself, which will unquestionably lead to lost production and decreased economic activity. Rationing per se will impose an additional burden on a variety of businesses and individuals such as the operators of gas stations who will have to keep track of coupons as well as money. These private sector costs, though real, are impossible to quantify.

The Department of Energy acknowledges that any rationing plan will inconvenience large numbers of users, but in times of serious shortages, rationing would assure access to some gasoline by all motorists (particularly priority users) and would help to eliminate waiting lines, stabilize the market for gasoline, and mitigate economic disruption. The implementation of rationing in this view is expected to make substantial savings in GNP by avoiding those problems, in addition to those inherent in the energy shortfall, which would otherwise occur as a result of unnecessary dislocations.

DOE has also examined the income distribution effects of the current plan. Their calculations indicate that the poor would benefit, middle income users would pay most for additional gas, and the relatively wealthy would also lose, but probably relatively less than middle income motorists. DOE has also analyzed the effect of issuing ration rights on the basis of licensed drivers rather than vehicle registration. This analysis shows that this alternative would increase income transfers from households with higher income to those with lower incomes. Rationing

would clearly fall less heavily upon those groups owning fuel-efficient vehicles. DOE's calculations apparently have not taken into account the fact that wealthy households are more likely to own newer, more fuel-efficient cars.

DOE has examined the impact of rationing on suburban and rural areas. Suburban and rural households tend to drive more on average than urban households. This additional driving, however, does not represent a more intensive use of particular vehicles, but rather the operation of a larger number of vehicles. Miles traveled per vehicle is surprisingly constant. Therefore, DOE does not foresee hardships for suburban and rural households arising out of rationing.

Conclusion

While rationing has a certain surface appeal, the questions raised here cast doubt on its practicality. Indeed, rationing is clearly not workable now, and there are indications that even with adequate pre-implementation the program would be disastrous. After all, this gigantic program would have to be instituted and run in the midst of a much more serious oil shortfall than the country has had to face. The confusion and panic in such a situation count heavily against the smooth functioning of any large, novel, and complex distribution scheme. Clearly, if Murphy's Law 1/ works anytime, it will work during a 20 percent or greater oil shortfall. Other alternatives are available, and several are outlined in Chapter XII.

1/"Anything that can go wrong, will go wrong."

CHAPTER VII

INTERNATIONAL PROGRAMS AND MEASURES

An international coordinated response to foreign oil supply disruptions is very important to both U.S. energy emergency preparedness and broader U.S. interests as well. This is so for several reasons.

First, the fundamentally international character of the oil market makes coordinated multilateral actions to cope with disruption inherently more effective than unilateral actions. Actions other nations take to cope with a disruption will affect the results of our domestic contingency programs and hence our ability to weather an oil shortfall with minimal adverse impacts. For example, if other oil-dependent countries build substantial emergency reserves and draw them down during a disruption, or if they establish and implement effective demand restraint programs, competition for scarce oil supplies in the international market will be considerably reduced. Without such actions, competition for these supplies will increase, and less oil may be available to the United States. Furthermore, competition for scarce supply on international oil markets will increase upward pressure on oil prices, further damaging the U.S. economy, both during and after the disruption.

Second, a politically motivated oil disruption might be targeted on the United States. The 1973-74 Arab Oil Embargo is a case in point. Participating in an international contingency program that includes oil sharing among the members may enable us to better cope with these kinds of shortfalls, since we could be the beneficiary of shared supplies. In more general disruptions we could share or receive oil from other countries.

Third, most nations and nearly all of our allies are even more vulnerable to oil supply interruptions than we are. Should Europe and Japan be cut off from oil, their prosperity and stability and that of the entire international economic and political order could be jeopardized. Consequently, it makes good sense for the United States to encourage other nations to establish strong contingency programs that will enable them to manage oil disruptions. International programs provide a means for both encouraging such activities and coordinating them with our own to help ensure maximum benefits for all.

Recognizing these kinds of considerations, the United States took the lead in 1974 in promoting the creation of the International Energy Agency (IEA). Since then the IEA has been the centerpiece of U.S. efforts to coordinate international emergency preparedness for oil disruptions. Twenty-one industrialized countries have now subscribed to the IEA's International Energy Program.

The current IEA emergency programs would be useful to help member nations cope with disruptions, but they do not go far

enough. Existing programs are not sufficiently ready and are not strong enough to deal with the full range of disruption contingencies.

The United States has not effectively integrated its domestic contingency planning and programs with its IEA commitment. IEA emergency programs require that each country be capable of restraining demand by 10 percent and maintain emergency reserves equivalent to 90 days of net oil imports. As discussed elsewhere in this report, the United States has done neither. Consequently, in a major oil supply disruption that affects all IEA nations, one of two things is likely. Either we do not fully honor our obligations to other IEA countries, in which case they will be adversely affected, and our broader economic, political and national security interests may be harmed, or we honor our commitments, which means that the Nation will sustain an even greater oil supply shortfall than it otherwise would if we were properly prepared--with all the adverse economic consequences of a larger shortfall.

For these reasons, it is essential that the United States get its own contingency programs in order so that we can honor our IEA commitments and have a fully effective emergency preparedness program.

THE INTERNATIONAL ENERGY AGENCY

In early 1974, in the midst of the Arab Oil Embargo the President of the United States invited 13 industrialized and allied countries to Washington, D.C., to discuss a U.S. proposal for coordinated action to deal with the global energy crisis resulting from the oil embargo and oil related price increases.

The Washington conference led to the establishment of the International Energy Agency as an institutional mechanism for:

--taking common, effective measures to meet oil supply emergencies,

--promoting secure oil supplies on reasonable and equitable terms,

--promoting cooperative relations with oil producing countries and with other consuming countries, including those of the developing world,

--establishing a comprehensive international information program and a permanent framework for consultation with oil companies, and

--reducing dependence on imported oil by undertaking long term efforts on energy conservation,

accelerated development of alternative energy sources, and energy research and development. 1/

Sixteen nations signed the International Energy Program Agreement initially; since then five other countries have joined. All 21 are members of the Organization for Economic Cooperation and Development. France is the only major ally of the United States that is not a member of the IEA. However, France is indirectly associated with the IEA via its participation in the European Community. The European Community has an emergency sharing system which covers petroleum and substitutes used in the generation of electricity. With the exception of France, all members of the Community belong to the IEA.

The IEA represents a unique effort by a relatively large number of nations to deal with a particular international problem. Particularly noteworthy in the IEP Agreement is its Emergency Sharing System designed to respond to an oil shortage of 7 percent or more to one or more member countries. The agreement details the establishment of institutions, programs, and procedures by which the participants will counter oil shortfalls through demand restraint, emergency reserves, and supply sharing based on a formula responsive to individual member country oil consumption needs. The system depends on individual IEA nations implementing agreed upon programs and adhering to their emergency sharing commitments. The IEP (International Energy Program of the IEA) is an international agreement which does not provide for sanctions against countries which refuse to participate during a disruption.

The IEA also depends heavily on the cooperation and involvement of international oil companies. Forty-seven companies voluntarily participate directly in IEA activities, including 21 U.S. oil companies. Referred to as "reporting companies," they account for approximately 80 percent of all oil traded in the free world. An Industry Advisory Board (IAB), composed of the seven major oil companies and 11 independent and national oil companies, advises the IEA on emergency oil-sharing questions, appropriate emergency data and information systems, legal questions, and other industry concerns. The IAB helped to write an emergency management manual detailing operating procedures for implementing the Emergency Sharing System. An Industry Supply Advisory Group (ISAG) also exists. During an actual emergency and at the direction of an allocation coordinator, it assists in the coordination of operational and logistical actions necessary to implement the Emergency

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1/The discussion in this chapter focuses on IEA programs for dealing with oil supply disruptions. For a comprehensive examination by the GAO of U.S. involvement in all aspects of the IEA, including a more detailed review of some aspects of IEA's emergency sharing activities, see: "Unresolved Issues Remain Concerning U.S. Participation in the International Energy Agency," ID-81-38, September 8, 1981.

Sharing System. The ISAG members include the seven majors and 13 other companies.

THE EMERGENCY SHARING SYSTEM

Development and refinement of the Emergency Sharing System (ESS) was and continues to be the IEA's primary objective. There are three important aspects of the ESS: (1) international allocation of available oil supplies, (2) demand restraint, and (3) emergency reserves.

Each participating country subjects its oil supplies to international allocation during an emergency, thereby surrendering partial control of a critical resource. This commitment takes into account each nation's total oil supply, not just its imports. Thus, those countries with substantial domestic oil production--the U.S., Canada, and the U.K.--include these supplies in the calculation of how oil is to be shared in the event of a shortfall. (See ahead).

To "trigger" the ESS, the IEA Secretariat determines or makes a finding that one or more member countries are or can be reasonably expected to experience a 7 percent or more shortfall and determines the amount of oil to be shared. The system is activated if the Governing Board (composed of one representative from each member country) does not reject the finding within eight days. IEA members are expected to implement prescribed measures within 15 days.

Part of the strength, then, of the ESS system is that it commits each member to share in a shortfall even if it is not directly affected. However, given the very considerable dependence of the IEA nations as a group on oil imports, it is clear that allocation alone is not sufficient to provide security. Recognizing this, the IEP requires demand restraint and emergency reserves which are designed to enhance the ability of member countries to cope with interruptions.

Each participating country agrees to have a program of oil demand restraint measures enabling it to reduce its oil consumption by at least 7 and as much as 10 percent. Whenever the group sustains or can reasonably be expected to sustain a reduction in its oil supplies of 7 to 12 percent of its base period oil consumption, each member agrees to reduce its consumption by 7 or 10 percent of its base consumption, respectively. The IEA defines this as "permissible consumption". The difference between the permissible consumption of the members as a group and available supplies is the Group Supply Shortfall.

Each member assumes a portion of the Group Supply Shortfall based on its share of IEA oil imports. This is termed the Emergency Reserve Drawdown Obligation (ERDO). For example, if at the time of a disruption U.S. oil imports account for one third of IEA oil imports, the United States would be responsible for assuming one-third of the Group Supply Shortfall.

To be prepared for handling ERDO's, each participating country has agreed to establish and maintain emergency reserves equal to at least 90 days of net oil imports (average daily rate for the previous calendar year). The emergency reserve requirement can be satisfied by oil stocks, fuel switching capacity, or standby oil production. However, oil stocks are all that would be available to satisfy this requirement for most IEA nations.

Since all members agree to maintain the same number of days of emergency reserves, relative to oil imports, and since ERDO's are calculated on the basis of each member's share of total IEA imports, theoretically all member countries would exhaust their emergency reserves at the same time if those reserves consisted only of oil stocks. However, some countries may meet part of their reserve requirement from fuel switching or standby oil production. Moreover, the IEP does not require each member to actually use its emergency reserves in the event of a shortfall. Rather, each member's "supply right," or the amount of oil it is entitled to from available supplies, is calculated by subtracting its emergency reserve drawdown obligation from its permissible consumption. If a country wishes to, it could satisfy part or even all of its obligation by additional demand restraint. To do so, however, would further reduce the amount of oil it could consume during the disruption. Since demand restraint can entail substantial sacrifice, it seems likely that member nations would probably choose to draw down emergency reserves--provided they had the reserves.

Table 1 illustrates how the IEA Emergency Sharing System works, including how the IEA determines whether a member nation receives oil (an allocation right) or supplies oil to other members (an allocation obligation). The allocation obligation or right for each nation is calculated by subtracting the nation's supply right from its available oil supplies (domestic oil production as calculated for the base period, and imports actually available during the disruption). If its available supplies are greater than its supply right, it has an allocation obligation. If its available supplies are less than its supply right, it has an allocation right.

Since the international oil market is dynamic, allocation rights and obligations must be periodically re-calculated. Changes in any member country's net oil imports would alter its available supply, and hence affect the allocation rights and obligations of other members. When the Emergency Sharing System is in operation, new calculations are made each month. The IEA provides this information to national governments and reporting oil companies.

Capability of the IEA Emergency Sharing System to deal with oil supply disruptions

As discussed elsewhere in this report, in 1980 the Secretary of Energy stated that the United States must be prepared to deal

TABLE 1

ILLUSTRATION OF HOW THE IEA EMERGENCY SHARING SYSTEM (ESS) WORKS ASSUMING A 15 PERCENT OIL SUPPLY SHORTFALL
(MMBD)

	JAPAN	UNITED STATES	IEA EUROPE*	TOTAL*
NORMAL SUPPLY SITUATION 1980 (Base Period)				
(A) Domestic Oil Production	.0	10.0	2.5	12.5
(B) Plus Net Oil Imports	5.1	6.7	9.1	20.9
(C) Equals Available Supply	5.1	16.7	11.6	33.4
(D) Minus Stock Change	.1	.1	.2	.4
(E) Equals Base Period Consumption (BPFC)	5.0	16.6	11.4	33.0
EMERGENCY RESERVES REQUIREMENT				
(F) Net Oil Imports Times 90 Days (B x 90)**	459	603	819	1881
SUPPLY SHORTFALL TO IEA GROUP OF NATIONS				
(E) Base Period Final Consumption of the Group (E)				33.0
(G) Minus Disruption Available Supply—In this example assume 5 MMBD shortfall (C - 5.0)				28.4
(H) Equals Group Oil Supply Shortfall				4.6
(I) Minus the Group's Demand Restraint Obligation—In this example, 10% of BPFC (.10 x E)				3.3
(J) Equals Remaining Group Shortfall to be Met By Emergency Reserve Drawdown Obligation				1.3
SUPPLY RIGHTS FOR MEMBER NATIONS				
(E) Base Period Final Consumption	5.0	16.6	11.4	
(K) Minus 10% Demand Restraint (.10 x E)	.5	1.7	1.1	
(L) Equals Member Nation Permissible Consumption	4.5	14.9	10.3	
(M) Minus Emergency Reserve Drawdown Obligation +	.3	.4	.6	
(N) Equals Supply Right	4.2	14.5	9.7	
ALLOCATION RIGHTS OR OBLIGATIONS OF MEMBER NATIONS ++				
(A) Base Period Domestic Production	.0	10.0	2.5	
(O) Plus Available Net Oil Imports in Month of Disruption (Figures in this example assumed)	3.7	6.0	6.2	
(P) Equals Available Supply in Disruption Month	3.7	16.0	8.7	
(N) Minus Supply Right	4.2	14.5	9.7	
(Q) Equals Allocation Right (-) or Obligation	- .5	1.5	-1.0	

*To simplify the presentation, Canada, Australia and New Zealand are not included, and the IEA European countries are combined. In real use of the system calculations would include all participating countries on a nation by nation basis.

**In million barrels (MMB)

+The emergency reserve requirement of each (F) divided by the total emergency reserve requirement for all countries, multiplied by the remaining group shortfall (J).

++For the first month of the disruption. Since the international oil market is dynamic, allocation rights and obligations are re-calculated monthly. Changes in one or more member nations' net oil imports would change their available supply and hence affect the allocation rights and obligations of all members.

NOTES:

1. Data for domestic oil production, net oil imports and stock changes are for 1980. Bsed on figures provided in Quarterly Oil Statistics 1981/No. 1 (OECD: International Energy Agency, 1981). A conversion factor of 7.6 was used to convert metric tons to barrels, and a factor of 1.065 to convert product data to crude oil equivalent.

2. The example illustrated assumes a 5 MMBD shortfall in available supply and that the shortfall is not distributed equally among the countries and region shown prior to allocation. Disruption is assumed to begin in the second quarter of 1981.

with oil supply shortfalls of less than 1, 1-3, and 4-6 MMBD and lasting for one year. For the IEA these would represent shortfalls of less than 3, 3-8, and 11-16 MMBD. The scenarios roughly correspond to the loss of one medium volume oil-producing country in the Persian Gulf, the loss of a major producer or three other medium volume countries, and the catastrophic loss of nearly all Persian Gulf exports, respectively.

The ability of the ESS to cope with oil supply disruptions of these magnitudes is illustrated by Table 2. These figures indicate only the potential of the ESS to cope, since the table assumes that (1) the IEA Secretariat has information systems and other resources in place to operate the allocation system successfully, (2) the member countries have demand restraint programs capable of achieving reductions of 7 to 10 percent; and (3) the member countries have emergency reserves equivalent to ninety days of net oil imports that could be fully drawn down. The present status of both IEA and member nation programs makes these assumptions questionable. However, the table provides a benchmark for indicating the potential capability of the ESS if the system's components were fully ready to go.

As Table 2 shows, a fully operational IEA Emergency Sharing System could easily cope with an oil supply disruption of 3.5 MMBD. Demand restraint programs would absorb 2.5 MMBD of the shortfall and emergency reserves could absorb the remaining shortfall for 63 months--far longer than the postulated 12 month disruption. A fully functioning ESS could also handle a 7 MMBD disruption. Demand restraint would offset about one-half of the shortfall and emergency reserves could offset the remainder as long as 18 months.

Even a fully operational ESS could not, however, handle the worst case disruption. Emergency reserves would be exhausted in about 7 months. Clearly, other actions would have to be taken to deal with the shortfall before this point was reached. The IEP Agreement, itself, provides that the Secretariat will make a finding when cumulative daily emergency reserve drawdown obligations have reached or can reasonably be expected to reach 50 percent of emergency reserve commitments. Following such a finding IEA countries are supposed to decide on the steps required to meet the situation, including an increase in the level of mandatory demand restraint that may be necessary.

As stated, Table 2 illustrates the potential of the ESS to offset oil supply disruptions. In fact, there are problems with the IEA's allocation system, demand restraint and emergency reserves programs which currently make the actual case less than ideal.

The ESS allocation system and associated information systems

On paper the Emergency Sharing System appears straightforward and relatively easy to implement. In fact, however, the system

TABLE 2

POTENTIAL CAPABILITY OF IEA EMERGENCY SHARING SYSTEM TO HANDLE VARIOUS SIZED OIL DISRUPTIONS, BEGINNING IN 1981 AND LASTING FOR ONE YEAR*

	IEA Oil Supply Shortfall		
	3.5 MMBD	7.0 MMBD	12.0 MMBD
Pre-disruption available oil supply and base period final consumption (1980)	35.5	35.5	35.5
Minus demand restraint obligation	2.5	3.6	3.6
Equals IEA permissible consumption	33.0	31.9	31.9
Minus emergency reserves drawdown obligation	1.0	3.4	8.4
Equals available supply during disruption	32.0	28.5	23.5
Number of months emergency reserves would last if fully drawn down	63.1 mos.	18.5 mos.	7.5 mos.
Number of months emergency reserves would last if drawn down halfway	31.5	9.3	3.8

*Assumes that (1) the IEA Secretariat has information systems and other resources in place to operate the allocation system successfully, (2) the member countries have demand restraint programs capable of achieving reductions of 7 to 10 percent, and (3) the member countries have emergency reserves equivalent to ninety days of net oil imports that could be fully drawn down. For a discussion of these assumptions, see pages 8-26.

NOTES:

1. Table assumes (1) disruption begins in the second quarter, (2) no increase in domestic oil production beyond what might be available and used to satisfy emergency reserve drawdown obligations, (3) supply shortfalls are net of stock buildup which was underway during the base period, and (4) pre-disruption available oil supply is equivalent to base period final consumption.

2. Figures for base period oil consumption and the emergency reserves drawdown obligations were calculated on the basis of data provided in Quarterly Oil Statistics 1981/No. 1 (OECD: International Energy Agency, 1981.)

is extremely complex and relies heavily on accurate and up-to-date information on how the oil market is behaving.

The international oil market consists of many oil exporting and importing nations, and a much larger number of oil companies and middlemen engaged in the oil trade. Furthermore, there are numerous arrangements by which oil is bought and sold among these parties. According to one source, in early 1980 about 45 percent of producer nations' oil was sold directly by the producer nations to other governments, independent oil companies, on the spot market, or in processing deals. This oil in turn could be re-sold to oil companies, refiners, distributors, and trading companies. It is estimated that the other 55 percent of producer nations' oil for export was handled by oil companies operating in these countries. The companies obtain oil through equity and buy back arrangements, and in turn use it in their own system or sell it to third parties. 1/

While there is a great deal of publicly available information on the international oil trade, much of it is dated and hence would be of little or no value in dealing with an ongoing disruption. Furthermore, for commercial and other reasons, much of this activity is secret. The spot market is a case in point. The spot market is informal; buyers and sellers come together through a world-wide network of personal and professional contacts. Participants may be oil producers, refiners, brokers, or traders (who buy and sell for their own account). Deals are almost always made by telephone or telex. The result is a mosaic of sales and swaps in which a single cargo may change hands several times before reaching its destination.

The IEA comes into this extremely complicated situation with a need for data on member countries' indigenous oil production, imports, exports, inventories, and stocks at sea for both crude oil and petroleum products. The IEA secures such information from both reporting oil companies and member nation governments. In normal conditions the IEA collects quarterly supply data which enables it to update net oil imports, base period oil consumption, and emergency reserve requirements for each member. The IEA also collects quarterly supply and demand forecasts from member countries and participating companies, which enables it to identify possible future supply shortages. If the IEA anticipates that the Emergency Sharing System may have to be activated or if the system is activated, the IEA also collects monthly supply data (historical, current, and forecast). This data is required to calculate the extent of the IEA group shortfall, so that demand restraint and member nation emergency reserve drawdown obligations can be determined, and to calculate each nation's supply right and allocation right or obligation.

1/David A. Deese and Joseph S. Nye, ed., Energy and Security (Cambridge, Mass.: Ballinger Publishing Company, 1981), pp. 23-27.

The allocation mechanisms

To ensure that allocations actually occur as intended once the ESS is triggered, the IEA has developed three types of allocations which can be implemented at the same time. The second and third are activated if the preceding fail or are judged not likely to fully achieve the intended allocation. The three are:

--Type 1 which depends on normal commercial transactions to accomplish allocations. Each oil company voluntarily rearranges its own individual supply schedule to meet the shortfall as it chooses.

--Type 2 in which companies work through the IEA in voluntarily redirecting supplies to satisfy the rights and obligations.

--Type 3 in which the IEA notifies member countries with allocation obligations that they must select a company or companies to ship oil to countries with allocation rights.

Thus, the Type 1 allocation relies on normal market operations to even out supply imbalances among member countries. In the Type 2 allocation, reporting oil companies and each country, acting on behalf of its non-reporting oil companies, submit offers to the IEA to give or receive oil. The offers are supposed to help satisfy a participating country's allocation right or allocation obligation as identified by the IEA. The offers are specific and detailed, identifying the amount of crude oil or product desired or being offered, and so forth. The IEA then determines which give and receive offers can be matched, and notifies all offerors accordingly. In an ideal situation, sufficient offers and matches will have been made to permit a balancing of the member countries' allocation rights and obligations. If an imbalance still remains, the IEA then notifies member countries with remaining allocation obligations that they must select, and in effect order, a company or companies to ship oil to countries that still have allocation rights.

Unfulfilled allocation rights and obligations carry over from month to month. The IEA provides guidance as to priorities with respect to current or future months, but there is no express limitation on a member nation with respect to the month during which its obligations are to be met.

Problems of the allocation system

The IEA allocation system has never been tested by a disruption; consequently it is not clear how well the system will work. The IEA has conducted 3 simulation tests of the system--a limited one in 1976 and more comprehensive ones in 1978 and 1980. Actual disruption scenarios are constructed for test purposes, and historical oil company and country data are used as a basis for operating the tests. While these tests have involved extensive testing of certain system components, the entire system has still not been fully tested. For example, during a test allocation rights

and obligations are assessed; however, actual diversion of supplies does not take place. Also, all three tests have been volumetric and logistical; they did not address such commercial issues as pricing the allocated oil. Nor did they involve testing Type 3 allocations or procedures for handling detailed product imbalances. Consequently, the simulation tests provide only a limited assessment of the system's worth.

Accurate and timely information on available and projected oil supplies is critical to successful allocation system operation. The simulated tests and recent IEA experience with actual activation of emergency information system components revealed:

--inadequate coverage of available supplies by importers and stock holders for some countries;

-inaccurate forecasting of available oil supplies in monthly submissions which resulted in consistent overestimates of available supplies.

The 1979 Iranian oil supply interruption also exposed weaknesses in the information system. During the early stages of the Iranian shortfall, there was concern that a 7 percent shortfall might occur in some countries. However, the data IEA received concerning production, inventories, imports, and exports was so unreliable that a trigger decision could not have been made with any firm assurance that a 7 percent shortage did exist. Fortunately, supply increases by Saudi Arabia and other producing countries made the decision unnecessary.

Since then, the IEA has taken steps to improve data quality. Even so, the third test of the allocation system (held in October - December 1980) resulted in data discrepancies that the IEA Secretariat could not resolve: oil was lost from the system in the implementation of allocation rights and obligations, and international flows could not be balanced. The IEA sought to resolve the discrepancies by guessing, a most arbitrary technique. Staff of the Department of Energy's Economic Regulatory Administration, assessing the allocation test results, concluded that the IEA data system cannot now function properly. In a real emergency arbitrary balancing by the IEA would be highly controversial, which in turn could result in a breakdown of the ESS.

A related question concerns how objective oil companies or member countries may be in providing forecast supply and demand information during an actual disruption. Market conditions and access to supplies will be very uncertain. Given the high stakes involved, they may submit overly pessimistic forecasts of their supplies and report their current supply situation late if it is favorable. This behavior could lead to significant distortions in the IEA's calculation of allocation rights and obligations, which in turn could impede allocation of oil to the nations most in need. Since the IEA does not seek to systematically verify the accuracy of data submitted to it, this is a possibility.

A second problem area concerns the pricing of allocated oil. The IEP agreement states that prices of redirected oil should reflect "comparable commercial transactions" but does not define this term; thus price disputes between companies as well as IEA member countries can occur which might delay or disrupt the allocation process. Since member countries do not maintain uniform pricing policies, price disputes are a distinct possibility. No country can be prevented from establishing price regulations during a supply interruption. This could range, for example, from setting a ceiling (such as Italy has done in the past) to specifying a formula for controlling prices. All other things being equal, oil companies which voluntarily chose to divert oil presumably will seek to ship their lowest cost oil to those countries which regulate prices and direct high priced shipments to countries which allow prices to rise freely to market clearing levels. Companies may even choose not to send or divert oil to countries where they cannot recover costs plus profit.

Thus, price differentials could significantly affect the type of allocation procedure employed by the IEA. If the differentials are large, normal commercial transactions (Type I) or voluntary offers to redirect supplies (Type II) may not balance the allocation rights of countries which regulate prices necessitating resort to the Type III allocation, where the IEA notifies member countries with allocation obligations that they must select a company or companies to ship oil to countries with allocation rights. A price dispute could easily occur when a company is directed to ship oil to a country which has an allocation right but whose national price ceiling is too low to attract shipments by oil companies. Unless the involved companies can reach agreement through arbitration or other means, it is likely the oil will not be diverted according to the allocation formula.

In July 1980, the IEA established a Dispute Settlement Center to arbitrate price disputes between oil companies during international oil allocations. IEA officials believe the Dispute Settlement Center will ensure smooth operation of the Emergency Sharing System. Nevertheless, the mechanism has two weaknesses. First, agreement by oil companies to use the Center is voluntary, and second, the Center does not address price disputes between IEA member countries.

DOE officials have expressed great concern about potential unresolved price disputes affecting the U.S. obligation to the IEA. They state that DOE would not force a U.S. oil company to divert oil to meet U.S. allocation obligations unless the other company agreed beforehand to use a mutually acceptable price dispute mechanism.

A third potentially serious problem with the allocation system is whether the member governments can ensure that oil companies operating in their respective countries will receive a "fair share" of the total oil available to each country. The IEA Secretariat has surveyed the country programs, but has not assessed the operational effectiveness of the programs; and oil

companies are uncertain about how well some country programs would work. The programs are necessary to secure voluntary offers by oil companies to divert oil from countries that have allocation obligations to ones with allocation rights. If companies are not assured of fair sharing, they are not likely to participate. This will force the IEA Secretariat and member countries to rely on the Type 3 allocation, which is more burdensome.

This is another example of where IEA commitments strongly influence U.S. domestic contingency policy. If the U.S. does not have a way to share its IEA obligation among U.S. companies, company participation in voluntary sharing may be in jeopardy. DOE's current draft contingency plan states that oil companies will not voluntarily participate in the ESS if it adversely affects their domestic refinery or marketing operations relative to other domestic refiners. Thus, the plan says, the success of the voluntary phase is dependent upon the existence of a domestic program which equitably distributes available crude oil supplies. However, as discussed in Chapter VI, authority for general domestic allocation will expire with the expiration of EPAA on September 30, 1981.

Section 251 of the Energy Policy and Conservation Act (1975) provides the President with independent authority to require actions that he determines to be necessary for implementation of U.S. obligations to the IEA relating to the international allocation of petroleum products. According to an August 10, 1981, DOE legal opinion, concurred in by the Department of Justice, this authority is sufficient to permit establishment of a system for allocating crude oil among domestic oil companies to support our international IEA obligations but not a comprehensive domestic oil allocation and price control system comparable to that initiated under EPAA. Furthermore, DOE recently advised GAO that certain EPAA standby mandatory domestic allocation and pricing regulations, which may be necessary to carry out U.S. obligations under the IEP, will continue in effect after September 30, 1981, since they are authorized under Section 251 of EPAA. GAO is presently examining DOE's authority to use Section 251 to establish such a domestic allocation program.

The Cabinet Council on National Resources and Environment recently recommended to the President that the administration should oppose enactment of some form of petroleum regulatory authority for essential emergency services to replace EPAA when it expires at the end of September 1981. Concerning our international sharing obligation, it recommended development of a plan, based on EPCA authority, for fair sharing among U.S. oil companies which the President could use if he deemed it necessary to meet our obligations. At about the same time DOE issued a report stating that it plans to develop a contingency plan for a limited crude oil "fairsharing" system to backstop voluntary offers, for activation should the President deem it necessary to meet our international obligations. The aim of this system will be to assure U.S. oil companies that the burden of supplying oil to the IEA sharing system will be shared equitably, if necessary through

government ordered transfers of crude oil among them. It will be a very narrow system in order to minimize adverse effects on market decision-making and efficiency.

However, until such a system is developed and in-place on a standby basis, the U.S. ability to effectively meet IEP obligations, should they arise, will not be assured.

Two other problems with the allocation system deserve mentioning. First, the IEA Secretariat has a professional staff of only about 60 persons. This staff is responsible for all of the IEA's activities, not just emergency sharing. Although the IEA staff would be assisted by oil company personnel during an emergency, it is questionable whether the combined staff could handle the workload involved in a disruption that involved Type 2 and Type 3 allocations. A related consideration is the adequacy of computer resources. During the second and third tests of the allocation system, computer processing of give and receive offers was ineffective.

Second, while IEA reporting companies account for 80 percent of oil traded in the free world, nonreporting oil companies could significantly affect its operation. During the first half of the third allocation system test, there was a serious problem because allocation give offers were much greater than receive orders. The IEA Secretariat felt that an important reason for the mismatch was the nonparticipation of non-reporting companies in the United States. U.S. non-reporting companies did not participate in the exercise, since they were not covered by the U.S. antitrust exemption granted to reporting companies.

Problems with the ESS emergency reserves program

The Emergency Sharing System's ability to cope with oil interruptions depends largely on member nations' emergency reserves. As disruption size increases, so does the importance of emergency reserves. However, most IEA nations do not maintain emergency reserves capable, as the IEP stipulates, of sustaining consumption for at least 90 days with no net oil imports. They are able to avoid doing so because of the way in which the IEA has defined emergency reserves.

The IEP Agreement states that the emergency reserve commitment can be satisfied by oil stocks, fuel switching capacity, and standby oil production. An annex to the agreement defined oil stocks to include crude oil, major products, and unfinished oils held in refinery tanks, bulk terminals, pipeline tankage, barges, etc. The annex stated that emergency oil stocks would not include "those stocks which can be technically determined as being absolutely unavailable in even the most severe emergency." Until this concept was further examined and criteria established for measuring absolutely unavailable stocks, the agreement said that each member country would subtract 10 percent from its total stocks in measuring its emergency reserves.

The 1974 Agreement also stipulated that the IEA Standing Group on Emergency Questions would examine whether each participating country was effectively meeting its emergency reserve commitment. These examinations have not been made. The IEA has, however, had consultations with oil companies concerning the extent to which oil stocks might be available for emergency purposes.

The present IEA definition allows serious overstatement of true emergency reserves, since it counts industry inventories that are working stocks used for normal operations. IEA officials stated that this broad definition of emergency reserves was a political compromise to achieve consensus on establishing a quantifiable commitment. They said some members were opposed to a more realistic definition of emergency reserves because of difficult domestic political liabilities which would arise in establishing costly government reserve programs or forcing the oil industry to maintain and finance additional stocks.

As noted elsewhere in this report, the potential of U.S. industry stocks to offset supply shortages is controversial. Until 1978 the consensus in Government and industry was that industry stocks were essentially required for minimum working level purposes and hence were not large enough for purposes of contingency planning. However, the record high stock levels attained in 1979 and maintained through 1980 have led to a reappraisal of the amount of industry stocks that could be made available in an emergency. In late 1979 a DOE official testified that the United States requires about 50-60 days of oil supply for working level purposes; recent information on stock levels published by DOE is consistent with this figure. According to this estimate, industry oil stocks that could be used for emergency purposes are very substantial, ranging in recent months between 100-200 MMB or more.

The estimated minimum working level of oil stocks is less for most other IEA nations. According to some sources, for IEA European nations and for Japan it ranges between 30-45 days.

Table 3 illustrates how working stocks affect the availability of oil stocks for emergency use. The Table shows that at the end of 1980, oil stocks in the United States, Europe, and Japan considerably exceeded the IEA emergency reserves requirement (compare columns B and C.) However, if one subtracts from actual stock levels estimated supplies required for working level purposes (column A), the remaining stocks available for emergencies are considerably less than the IEA emergency reserves requirement (compare columns C and E). For example, the United States had 1390 MMB of oil stocks, but of this an estimated 996 MMB were required for minimum operating purposes.

As noted earlier, the IEA subtracts 10 percent from total stocks as an estimate of those stocks which are absolutely unavailable in even the most severe emergency. Column D presents the results of this calculation. A comparison of the figures in columns D and E shows that the subtraction of only 10 percent of total stocks yields results far higher than those that result from subtracting estimated supplies required for working level purposes, where one assumes that IEA Europe and Japan require 45 days of

TABLE 3

IEA* EMERGENCY RESERVE REQUIREMENT, ACTUAL OIL STOCKS, AND STOCKS THAT POSSIBLY COULD BE USED IN EMERGENCIES, 1981

	A	B	C	D	E	F
	Estimated Minumum Working Level Oil Stocks Required a/ (MMB)	Actual Oil Stock Levels End 1980 (MMB)	IEA Emergency Reserves Requirement b/ (MMB)	Actual Oil Stocks Minus Ten Percent c/ (MMB)	Estimated Oil Stocks Which Possibly Could Be Used In Emergencies d/ (MMB)	Estimated # Days Oil Stocks Which Possibly Could Be Used in Emergencies e/ (Days)
IEA Europe	513	1233	819	1101	710	78.0
United States	996	1390	603	1251	394	58.8
Japan	225	501	459	451	276	54.1
Total*	1734	3114	1881	2802	1380	66.0

*Excludes Australia, Canada, and New Zealand.

a/Final oil consumption for 1980 times estimated number of days oil supply required for working level purposes (assume 45 days for IEA Europe and Japan, 60 days for the United States).

b/Net oil imports for 1980 times 90 (days).

c/Column B minus 10 percent of B. The IEA subtracts 10 percent from total oil stocks to estimate stocks which are absolutely unavailable in even the most severe emergencies.

d/Column B minus Column A.

e/Column E divided by net oil imports in 1980. If oil stocks which possibly could be used were drawn down at a rate equal to net oil imports. Can be compared to the IEA requirement that member nations maintain emergency reserves equivalent to 90 days of net oil imports, recognizing that standby oil production and fuel substitution can also be used to meet the requirement.

NOTES:

1. Table assumes that disruption begins in the second quarter, and that stock levels at that time approximate those existing at the end of 1980.

2. Figures on final oil consumption, net oil imports and actual oil stock levels, as shown or used in preparing the table, are based on data provided in Quarterly Oil Statistics 1981/No. 1 (OECD: International Energy Agency, 1981).

working level stocks and the United States 60 days. According to the latter method, in early 1981 Japan had the equivalent of only 54 days of net oil imports, the United States 58, and IEA Europe 78. (See column F). 1/ While the table does not show it, a year earlier, at the end of 1979, the situation was even more serious. Use of the same estimating procedure indicates that at that time U.S. oil stocks possibly available for emergency use were equivalent to only 34 days of the 90 days emergency reserve requirement; Japan 39 days; and IEA Europe 61 days.

Because stocks actually available for emergencies appear to be considerably less than 90 days, the ability of the IEA to cope with oil supply disruptions is diminished. Table 4 shows that in early 1981 oil stocks apparently usable for emergency purposes were more than adequate to deal with a shortfall of 3.5 MMBD (or 10 percent of final oil consumption) lasting for a year. For Japan, IEA Europe and the United States as a group, emergency oil stocks would only be half drawn down after 25 months. However, in an oil supply disruption of 7 MMBD (equivalent to 20 percent of final consumption), emergency oil stocks would be nearly exhausted if the interruption lasted for a year. The oil stocks of Japan and the United States would be drawn down halfway in 6 months or less, confronting the IEA nations with difficult decisions about additional actions needed to deal with the shortfall. A worse case oil supply disruption of 12 MMBD (33 percent of final consumption) would even more rapidly confront the IEA nations with crisis decisions. Oil stocks usable for emergencies would be drawn down to the halfway point in 2-3 months if used to offset the disruption, and this is assuming that IEA demand restraint obligations are fully met.

Another consideration in evaluating the ability of emergency reserves to cope with oil supply disruptions concerns control of the stocks. In nearly all IEA countries control of primary oil stocks is in private hands rather than member country governments or special government companies. The exceptions are Denmark, West Germany and Japan. A question exists concerning whether, in the event of an oil supply disruption, the IEA member country governments could exercise effective control over oil stocks in their respective countries to implement their emergency reserve drawdown obligations. Countries which cannot control stocks run the risk that stocks will be drawn down too quickly or not too quickly, demand restraint programs may not be fully realized and the countries' ability to cope with lengthy disruptions will be compromised. If stocks are not drawn down quickly enough, adverse economic impacts over the short run will increase, as will personal hardships. At the same time, spot market demand for oil will grow, increasing pressure on prices.

1/A major assumption of the table is that member nation demand restraint programs would operate successfully to achieve the IEA demand restraint obligation appropriate to each of the disruption cases. If this assumption was not realized in practice, emergency oil stocks could be drawn down at a faster rate.

TABLE 4

NUMBER OF MONTHS WHICH OIL STOCKS, ESTIMATED AS POSSIBLY USABLE FOR EMERGENCY DRAWDOWN PURPOSES, COULD HAVE OFFSET VARIOUS OIL SUPPLY SHORTFALLS IN 1981

	3.5 MMBD IEA Shortfall		7.0 MMBD IEA Shortfall		12.0 MMBD IEA Shortfall	
	Stocks Fully Drawn Down	Stocks Drawn Down Halfway	Stocks Fully Drawn Down	Stocks Drawn Down Halfway	Stocks Fully Drawn Down	Stocks Drawn Down Halfway
Japan	45.4	22.7	11.3	5.7	4.5	2.3
IEA Europe	58.3	29.2	15.6	7.8	6.5	3.3
United States	43.2	21.6	11.8	5.9	5.0	2.5
Total*	50.4	25.2	13.4	6.7	5.5	2.8

*Excludes Australia, Canada, and New Zealand.

NOTES:

1. Assumes disruption begins in the second quarter and the Emergency Sharing System is activated. The base period for calculating final oil consumption and emergency reserve drawdown obligations is 1980.

2. Assumes (a) no increase in domestic oil production, (b) supply shortfalls are net of stock buildup which occurred during the base period, (c) stock levels at the start of the disruption approximate those at the end of 1980, (d) oil stocks are drawn down at a rate equal to the emergency reserve drawdown obligation; and (e) demand restraint obligations are fully met.

3. Stocks possibly usable for emergency drawdown purposes were estimated as reported in Table 3.

4. Figures on final oil consumption, net oil imports and stock levels, as shown or used in preparing the table, are based on data provided in Quarterly Oil Statistics 1981/No. 1 (OECD: International Energy Agency, 1981).

Little is presently known concerning the ability of other IEA governments to control oil stocks. The IEA has conducted various studies of oil stocks, but it has not assessed the operational effectiveness of each member country's emergency reserve programs. However, most IEA countries are more dependent than the United States on oil relative to total energy consumption, more dependent on oil imports, and without any significant potential for either standby oil production or fuel switching. For these countries effective control over their respective oil stocks is absolutely essential to satisfy their emergency reserve drawdown obligations.

Concerning the United States, industry officials contend that their oil stocks are part of working inventories and that the amount of pure emergency reserves is very small. While our analysis indicates that considerable industry stocks could be used for emergency purposes, if necessary, officials from several major oil companies we recently contacted in a separate review stated that they had no stocks available or set aside for IEA purposes, and that the U.S. Strategic Petroleum Reserve is meant to meet U.S. obligations. The Federal Government has legal authority to manage private oil stocks for emergency purposes, but it does not have the capability to exercise effective control over industry stocks. DOE has prepared a draft plan for developing such a capability, but the plan has not been approved and thus implementation has not begun. Moreover the legal authority for the Federal Government to manage private oil stocks for emergency purposes expires on September 30, 1981, and the administration does not intend to request its extension.

Consequently, the only oil stocks that the Government can be absolutely sure of using in an emergency are those in the Strategic Petroleum Reserve. As of June 1981 these were about 160 MMB--far short of the approximately 600 MMB that would be needed to equal 90 days of recent net oil imports. As noted above, the emergency reserve commitment can also be satisfied by standby oil production and fuel switching capability. However, as discussed in Chapter III, there is no operational U.S. surge oil production program. As discussed in Chapter IV, DOE has several fuel switching programs. However, their present capability to offset shortfalls is not large--perhaps 85 MBD within three months and 100-470 MBD within 6 months.

As was shown in Tables 3 and 4, actual IEA oil stocks do not appear sufficient to deal with very large oil supply disruptions over an extended period of time. Yet, because emergency reserves are such a vital component of the Emergency Sharing System, the conclusion which follows is that the IEA implicitly or explicitly assumes that severe and extended disruptions or multiple smaller disruptions either will not occur or are of such low probability that they need not be prepared for.

ESS demand restraint program problems

Demand restraint is an essential ingredient of the IEA Emergency Sharing System. Its importance is further highlighted in

Table 5. It shows that demand restraint programs should fully offset supply disruptions that reduce overall oil consumption by 7 percent. Even for disruptions that reduce oil consumption by 10 to 20 percent, demand restraint is supposed to offset most of the shortfall. Demand restraint obligations would even offset nearly one-third of a worst case disruption.

TABLE 5

THE ROLE OF DEMAND RESTRAINT IN EMERGENCY OIL SHARING

Percent Oil Supply Shortfall	7	10	20	33
Percent Demand Restraint Obligation	7	7	10	10
Demand Restraint Obligation as a Percent of Oil Supply Shortfall	100	70	50	30

The IEA has defined demand restraint very loosely to include persuasion (i.e., public information programs), compulsory orders (i.e., banning use of automobiles on weekends), fuel switching, allocation, rationing, and even price measures. This definition is quite different from ours (see Chapter V) and so broad that it reduces the value of using the term. It includes many of the energy policies which can be used to cope with oil supply shortfalls, yet which can have very different effects in terms of impacts on individuals, the economy and society more generally. For example, if a capability exists to substitute other energy sources for a substantial oil shortfall, the economic costs and personal hardship costs are likely to be minimal, whereas the use of allocation programs could result in substantial losses in economic output and considerable personal inconvenience and suffering. Similarly, increased prices alone could be used to fully offset a shortfall, but at great cost to the economy and energy consumers.

By defining demand restraint to include all of these policies, it is difficult to know what the costs would be to any particular IEA country if it had to implement 7 or 10 percent demand restraint. The costs would depend on the particular kinds of policy programs the country has at its disposal.

The IEA definition also involves the possibility of double counting. As noted earlier, the IEA defines emergency reserves to include oil stocks, fuel switching capacity, or standby oil production. Thus, fuel switching can be counted under both emergency response actions. One must be careful not to include the same fuel switching capacity under both responses; otherwise the coping capability is exaggerated.

Unfortunately, it is doubtful whether many IEA nations and the IEA as a whole have demand restraint programs capable of reducing consumption by 7 or 10 percent. A good example of this is the United States. As demonstrated in Chapter V of this report, the United States has only a few demand restraint programs, and

they could accomplish little in terms of offsetting an oil supply shortfall.

In 1980 U.S. oil consumption averaged 17.1 MMBD. This means that the United States should have demand restraint programs capable of reducing consumption by 1.2 - 1.7 MMBD. Using our more narrow definition of demand restraint the Nation has a capability of perhaps 210-340 MBD, which is far short of our obligation. We would not add to that fuel switching capability, since our emergency reserves capability is far short of our obligation. That means the gap would have to be made up by either allocation or price increases--not very attractive alternatives.

The 1974 IEP Agreement stipulated continual review of each country's demand restraint program. But reviews which have been conducted have been infrequent and cursory. Reviews have typically involved only a few individuals representing the IEA and have been conducted in a few days or less. For example, the IEA review of the U.S. demand restraint program was performed by two examiners from the IEA over a period of two days.

The third simulation test of the ESS, held between October and December, 1980, tested demand restraint programs much more thoroughly than did the first two tests. In the U.S. test, eight States participated (California, Colorado, Florida, Massachusetts, Michigan, Minnesota, Virginia and Washington). The U.S. exercise lacked realism, however, because authority did not exist for some of the measures used, and the exercise assumed that the states would implement programs that DOE knew were not ready for use. DOE estimated that the measures would reduce demand by about 1.3 MMBD. However, since these measures could not be counted on to restrain demand adequately, DOE activated the standby mandatory crude oil allocation program to ensure that the U.S. IEA demand restraint obligation was met. However, allocation does not restrain demand, and so the "savings" generated by this action were illusory.

Perhaps the best evidence to date on the utility of the IEA members' demand restraint programs is seen in how the countries responded to the 1979 Iranian oil supply interruption. In the midst of that disruption the IEA Governing Board met and agreed that member countries would voluntarily reduce their anticipated 1979 oil demand by 5 percent, or about 2 MMBD. That target was never met. Except for the United States and a few others, the participating countries were able to reduce anticipated consumption by an average of only 2.6 percent by the end of 1979. Furthermore, a GAO study found that the U.S. reduction was mainly due to shortages rather than to DOE's plan. 1/

Since demand restraint means reduced consumption, reducing oil demand by 7-10 percent will necessarily involve substantial

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1/GAO Letter Report to Senator Henry M. Jackson regarding the Iranian Oil Cutoff, EMD-79-88, August 27, 1979.

economic costs and personal sacrifice. Costs will vary depending on the relative importance of petroleum as an energy source in each IEA country and the extent to which the past price of energy and other factors have already stimulated reduced energy usage and consequently reduced the amount of "fat" in energy usage. Presumably, the costs would be much greater for a country like Japan where oil accounts for 80 percent of its total energy requirements, as compared to the United States, where oil accounts for only 50 percent of energy consumption.

Perhaps a rough approximation of the economic costs that could accompany 7-10 percent demand reduction in the United States can be seen in the following figures which were also noted in Chapter I. The Congressional Budget Office estimated that a 2 MMBD shortfall to the nation occurring in 1984 and lasting for one year would reduce GNP by about $146 billion (1980 dollars) or 3.6 percent, increase the projected inflation rate by 7 percent and increase the projected unemployment rate by 1.1 percent in that year.

Perhaps the most important reason why demand restraint programs have produced better results is that many of the measures do entail substantial economic cost and personal sacrifice. Also, it is difficult to test or simulate the likely results of many of these measures before a disruption. What must be recognized, however, is that the Emergency Sharing System depends critically upon IEA countries having effective demand restraint programs that can be quickly implemented. (For purposes of calculating each country's permissible consumption, the IEA assumes that demand restraint measures are implemented 21 days after the ESS is activated.) Without such programs the economic costs and personal hardship are likely to be much greater. If demand restraint programs do not achieve the intended reductions, demand will exceed available supplies. This may lead to more rapid drawdown of oil stocks, compromising the ability of IEA countries to sustain disruptions of long duration. Also, upward pressure on oil prices will be further exaggerated.

Other limitations of the Emergency Sharing System

There are additional limitations of the system. Some of these concern its inability to deal with oil supply disruptions that are too small to trigger the system but which can nonetheless cause considerable damage to IEA countries. Others concern its ability to deal with larger oil interruptions as well. Particularly noteworthy is its limited ability to deal with dramatic price increases that can accompany oil shortfalls.

The ESS was designed to deal with 7 percent or greater shortfalls. The IEP lays out measures to be employed when such an oil supply disruption occurs. The ESS does not, however, include measures to deal with smaller oil supply disruptions.

The Iranian oil supply interruption, which began in late 1978 and continued into 1979, vividly demonstrated the damage that can be inflicted by smaller disruptions and associated oil price

increases. Temporary oil shortages amounting to about 2 MMBD were caused by the Iranian revolution in 1979. Nonetheless, a period of oil market instability began, punctuated by threatened supply disruptions and rapidly escalating crude oil prices. Despite decisions by Saudi Arabia and other OPEC governments to increase crude oil supplies by a million barrels a day, spot prices soared and served as a catalyst for OPEC producers to raise official crude oil prices. Between the fourth quarter 1978 and the fourth quarter 1979, the average OPEC crude oil official sales price nearly doubled, from $12.91 to $23.54 per barrel, even though OPEC and free world crude oil production increased during the same time.

Because the Iranian disruption did not resuIt in a 7 percent or more shortfall to IEA countries, the Emergency Sharing System was never activated. 1/ Demand restraint and emergency reserve drawdown obligations were not imposed. Yet implementation of effective demand restraint measures alone, and at less than the 7 percent level, could have more than offset the shortfall.

The IEA response to the disruption was to convene numerous government and industry meetings. The most tangible result was the March 1979 decision whereby member countries agreed to reduce anticipated consumption by 5 percent. That target was never met. The IEA also exhorted its members to stop purchasing high-priced spot market oil, but reluctantly admitted that without a 7-percent shortage, there was no mechanism in place to stabilize the market. Thus, the 1979 shortfall revealed the impotence of the IEA to respond to supply shortfalls below the 7-percent level. It also demonstrated that when challenged by an unstable market IEA nations in many instances opted for bilateral actions instead of multilateral unity and solidarity.

A second weakness in the ESS, also revealed by the 1979 disruption, was its inability to coordinate oil stock policies of member countries. Because the ESS was not activated, member countries were apparently free to build oil stocks if they wished. A frantic scramble to build stocks did occur and was a major contributor to upward pressure on oil prices during the

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1/Several IEA countries encountered oil supply situations in 1979 which threatened to activate the IEA Emergency Sharing System. In the spring Sweden experienced a supply shortfall of greater than 7 percent and requested that the system be triggered. The IEA Secretariat consulted with the Swedish Government and the involved oil companies and determined that no real oil emergency existed and that the situation would remedy itself if the Swedish Government took certain domestic actions, including raising national price ceilings to ensure supply. These consultations headed off a potential dispute within the IEA, and the Swedish situation eventually improved. The IEA used similar informal crisis management measures to alleviate similar supply shortages in other IEA countries.

1979 disruption. As a group, the IEA nations increased their stocks by 14 percent or 387 million barrels. Clearly, just maintaining rather than building stocks by the IEA countries could have had a significant and positive impact on the world oil market.

A third weakness of the system has been its failure to take account of several important kinds of oil stocks. These include stocks at sea and in the secondary distribution sector. The importance of these stocks to oil supply shortages is that substantial building of them can take place during a disruption, which in turn further increases the size of the shortfall.

The potential for building floating stocks is significant. The world's tanker fleet presently has a carrying capacity of 2.5 billion barrels, including an excess capacity of about 800 MMB. Not all of this excess capacity is available for floating storage, but a substantial portion is. Even a small increase in oil stored in excess tanker capacity could have a dramatic and adverse impact on oil available on international markets for sale to oil refiners.

Secondary oil stocks are large in many IEA countries. For the United States, the National Petroleum Council cites secondary storage capacity for gasoline and distillate fuel of at least 500 MMB, 60 percent as large as the primary storage capacity for these products.

The IEA emergency reserves requirement and the emergency reserve drawdown obligation apply only to primary oil stocks. It is possible, then, that in an oil supply disruption an IEA country could achieve its demand restraint obligation, reduce its emergency reserves according to its drawdown obligation, and still experience substantial retail product shortages because of stock-building and hoarding at the secondary level.

The IEA has lacked the information needed to tell whether and to what extent stockbuilding is occurring on tankers at sea or in the secondary distribution sectors. The IEA information systems, as originally designed, contained stock data only on primary stocks. Consequently, the ability of the IEA and its member nations to deal with oil supply disruptions was significantly limited.

This was recognized by the IEA Governing Board when it met in December 1979. The Board agreed that because stock movements are an essential element in determining market conditions, IEA member countries should increase their ability to influence stock levels. As a first step it directed that a plan be prepared for improving the information system on stock movements by adding information on stocks at sea, stocks in bonded areas (i.e., outside the customs area but within the political boundaries of a country), and secondary stocks. By March 1980 a plan had been prepared, and a system is now in place compiling information on stocks at sea. However, the IEA recently decided not to collect information on secondary stocks, and a meeting of the Governing Board, scheduled for late March 1981, discussed whether the IEA should discontinue

efforts to collect information on stocks at sea. Reportedly, some member countries and oil companies are opposed to gathering this information, while the IEA Secretariat still favors it.

A fourth weakness of the ESS is that the IEP does not include fallback measures to be used if demand restraint, reserve drawdown and oil sharing do not stem soaring spot market prices. Undoubtedly, if the three measures are employed and function reasonably well, pressures on spot prices will be substantially alleviated. However, IEA nations do not account for all the oil bought and sold on the world market. Furthermore, major questions exist concerning how well the ESS will work if called into operation. Consequently, skyrocketing spot prices could persist. If so, OPEC countries may conclude that their official sales prices can and should be dramatically increased.

A fifth weakness of the Emergency Sharing System cited by some observers is that there is no "guarantee" that the system will be activated when conditions warrant. In its most recent draft contingency plan for handling a substantial oil supply disruption, DOE itself notes that "while there are formulas and guidelines for arriving at a trigger decision, the process is not totally rigid. There is a considerable amount of judgment involved and inevitably, the political situation at the time may influence the outcome."

The IEP agreement provides that the ESS will be triggered when the IEA nations as a group or a participating country has experienced a reduction in oil supplies of 7 percent or more. However, generally the IEA Secretariat must first find that this is the case. There may be some situations where data available to the Secretariat are ambiguous concerning whether a 7 percent shortfall has or is about to occur and the Secretariat may delay acting.

Furthermore, even after the Secretariat has made a finding, the finding is subject to review and confirmation by member countries. By a "special majority" vote the IEA Governing Board can refuse to confirm a finding. "Special majority" refers to a system of voting weights and procedures used by the IEA to make decisions on certain specified matters. According to the way by which voting weights are distributed among member countries, it is perhaps not likely that the Board would vote against confirming

a finding by the Secretariat that a shortage exists. However, the possibility cannot be totally dismissed. 1/

A sixth weakness of the ESS concerns the ability of the member countries to share oil. One of the main purposes of the ESS was to counteract producer decisions to arbitrarily reduce exports to specific countries. Since 1974, however, the assumptions on which the system was founded have changed dramatically. In 1973, the major oil companies traded 75 percent of all crude oil traded internationally; by the end of 1979, their share had fallen to 42 percent. Because supplies are now reaching the market from other channels, the multinational oil companies' ability to adjust imbalances through intracompany allocation and third-party transactions is reduced. In addition a number of oil exporting countries are restricting the final destination of their oil. Thus, an IEA country with an allocation obligation may have less flexibility to fulfill it because of destination-restricted oil clauses. Since government-to-government deals between producer and consumer nations are increasing, more and more oil may eventually be unavailable for exchange in emergency situations. The IEA has been studying this problem to try to better assess its implications for the ESS. In June 1981 the Secretariat noted that even though increasing volumes of oil are being traded in government-to-government deals, most of the oil seems eventually to find its way into the company supply system. Thus, the problem may be less serious than was earlier thought.

A seventh weakness concerns the ability of U.S. oil companies to participate in IEA emergency planning activities. Since the formation of the IEA, the U.S. Government has recognized that the IEP Agreement cannot be successfully implemented without the assistance of at least the major U.S. international oil companies. Yet, company involvement could have anticompetitive consequences and result in antitrust suits against the companies. Officials of the U.S. companies that we visited stated that they would not voluntarily participate in the Emergency Sharing System without meaningful protection from antitrust suits arising out of their IEA activities.

1/If the Secretariat finds that the IEA group of nations is or can be reasonably expected to sustain a reduction of at least 7 percent, the United States could defeat a vote against confirming that finding by securing the support of Japan, or the support of any two of the following four nations (Canada, Italy, the United Kingdom or West Germany), or any five of the other remaining 14 member countries. (Note: Norway does not participate in votes.) If the Secretariat finds that an individual participating country is or can be reasonably expected to sustain a reduction greater than 7 percent of its base period final oil consumption, the United States and any other 3 members could defeat a vote against confirming the Secretariat's findings.

To obtain and authorize the companies' assistance in carrying out the U.S. obligations under the IEP, the Energy Policy and Conservation Act authorized the development and implementation of a Voluntary Agreement. This agreement, administered by DOE, sets forth the circumstances under which industry can participate in IEA activities. Upon approval for participation in the Voluntary Agreement, a U.S. company has available to it a statutory defense against any civil or criminal suit brought under Federal or State antitrust laws for actions taken to carry out the agreement, provided the actions were not taken for the purpose of injuring competition.

The Agreement confines most IEP pre-emergency industry activities to the meeting context. It permits exchange of confidential or proprietary company information and data only with advance Government approval. Specifically, the Department of Energy must consult with the Secretary of State, secure the concurrence of the Attorney General, who in turn must consult with the Federal Trade Commission, and approve in writing the exchange or provision of such types of information or data. This process including the document of approval, is referred to as a "clearance." Exchanges of proprietary or confidential information may take place in a number of different contexts, such as submission of data by the companies to the IEA Secretariat, individual company consultations with the Secretariat, group company consultations with the Secretariat, and so forth.

Authorization to exchange proprietary or confidential data is not taken lightly. U.S. Government clearances have been granted when an imminent international oil emergency, which could trigger the ESS, has been perceived. Such was the case with the Iranian oil cutback and the Iraq-Iran conflict. However, even in these situations clearances have generally been for short durations and subject to significant controls so as to minimize anticompetitive consequences. In addition, clearances were provided for the three tests of the ESS, again subject to significant controls.

Because of the short-term nature and lack of assured continuity of the U.S. clearances the IEA Secretariat has at times expressed frustration in not being assured a constant stream of data over long periods of time. It believes that such data is important in foreseeing general and selected shortfalls and in enabling a better understanding of the international oil market, and that it is essential in an emergency. Interruption of the data flow to the IEA means that assessments the IEA makes for governments on oil market uncertainties when they arise cannot be supported by an optimum data base.

Section 252 of EPCA, as amended, which provides for the Voluntary Agreement and the antitrust defense, expires September 30, 1981. Some U.S. Government officials in the legislative branch have suggested that the clearance procedure is not necessary for industry submission of data to the IEA, primarily because the U.S. Government can obtain the same information without an industry antitrust defense. An alternative would be for DOE to require

U.S. companies to submit necessary information to it, and DOE or State would then supply the information to the IEA when appropriate.

However, in our recent GAO report on U.S. participation in the IEA, we concluded that this alternative would involve a fundamental reordering of the existing IEA information structure. Consequently, the proposal could not be effectively implemented unilaterally by the United States, and we have reservations whether other participating governments would agree to it. Nor are we thoroughly convinced the alternative is preferable to the existing system. 1/

OTHER IEA PROGRAMS FOR DEALING WITH OIL SUPPLY INTERRUPTIONS

As a result of the problems caused by the 1979 Iranian oil supply interruption, the IEA undertook to examine ways to strengthen its ability to deal with supply interruptions too small to trigger the Emergency Sharing System. The areas emphasized included coordination of member policies on oil imports, stocks, and spot market prices.

Oil import ceilings

In May 1980, the IEA countries agreed on a system of ceilings for lowering import dependence over the medium term and as a guide for dealing with short-term disruptions. The system includes an agreement that if at any time tight oil market conditions appear imminent, Ministers will meet, decide whether tight conditions exist and if so, take action to restrain demand. In doing so, the Ministers will decide whether to use individual oil import ceilings to achieve demand restraint and monitor effectiveness. Even if ceilings are agreed upon, each nation's ceiling will be determined by the degree of self-restraint each nation is individually willing to impose on itself at that time.

Systems for consultation on stock policies and informal sharing

The December 1979, IEA Governing Board Meeting also agreed that the IEA should develop a system for consultation on stock policies among governments within the IEA and between governments and oil companies. The IEA Standing Group on the Oil Market prepared a proposal for such a system, and in May 1980, the Governing Board announced its approval.

The program consists of monitoring the stock situation, and a procedure for developing substantive policies for dealing with adverse trends. If the IEA member countries can agree on specific

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1/For elaboration on these points and a discussion of several other problems associated with the antitrust defense, see the GAO report identified in the first footnote of this chapter.

policies, it is up to individual member governments to decide how to implement them in consultation with the oil industry operating in the respective countries.

When war broke out between Iran and Iraq in September 1980, removing about 4 MMBD of oil from world markets, the IEA Governing Board met and decided on October 1 that oil stocks could be a principal means for coping with the problem and to make full use of the consultation system on stock policies for this purpose. The Secretariat's analysis showed that oil consumption within IEA countries was low compared to recent years, stocks were high, and that some spare productive capacity was available. It concluded that overall supply could be managed so as to meet demand over the coming months. Member countries agreed that during the fourth quarter of 1980 oil stocks should be drawn down to balance supply and demand; to achieve this, they decided that member country governments were to consult with the oil companies and one another. In addition, member countries were to urge private and public market participants to refrain from abnormal purchases on the spot market, reinforce conservation and fuel substitution measures for reducing demand, and make use of any spare oil production capacity.

Two months later the IEA Governing Board met to review progress and the outlook for the first quarter of 1981. The Board concluded that a combination of continuing high stock levels, declining oil consumption and additional oil production should make the situation manageable. To achieve manageability, the Board reaffirmed and extended the October 1 measures. In addition, member countries agreed to go a step further by establishing what amounted to an informal system for sharing oil. This was necessary, the Board said, "to correct serious imbalances which remain despite national efforts to correct internal imbalances and which are likely to result in undue market pressures on price..."

Under this system, the IEA Secretariat compares country supply positions against a theoretical supply determined by distributing total oil, expected to be available to the IEA group, among member countries in proportion to their base period final consumption. At the request of a member country, or on his own initiative, the IEA Executive Director identifies major crude oil or product imbalances which seem likely to result in upward pressures on price. There need not be a 7 percent selective or general shortfall or any other particular shortfall to qualify as an imbalance; this is a discretionary decision made by the Secretariat.

Once it has been determined that an imbalance exists, the informal sharing system is an elaboration, extension, and intensification of the consultation process used in implementing the consultative stock policy. The Secretariat consults with affected countries as to each's assessment of the imbalance and the measures required to correct it and discusses the situations with all delegations. The Secretariat also consults with individual companies in assessing the seriousness of the imbalance and in finding possible solutions and requests governments to consult with companies operating in their jurisdictions. The Executive

Director, taking all these consultations into account, identifies possible measures and sources that might provide the amounts of oil necessary to correct the imbalance. The Secretariat proposes these solutions to the governments of countries concerned for appropriate action as a matter of urgency. Each member government pledged its full support in order to ensure effective implementation. Commitments were also made to reduce imbalances among companies.

The system is a response to IEA's recognition that serious price consequences can flow from supply disruptions which are less than the 7 percent shortfall required to activate the formal Emergency Sharing System. It attempts to provide a restraining influence and to take into account the differing economic needs and capabilities of member countries. In the calculation for measuring an imbalance, the Secretariat is in a position to take into consideration a country's real requirements on a current basis, as estimated by the Secretariat in consultation with countries concerned. In addition, in identifying major imbalances which seem likely to result in market pressures, the Secretariat can take into account changes in demand for such reasons as economic growth, weather, and changes in energy structure.

By the end of the first quarter of 1981, frantic buying of oil on the spot market had not occurred and panic had been avoided. As a result of an improving global oil supply situation, the IEA did not extend use of the informal sharing system into the second quarter. It is available for future use if judged necessary.

The IEA systems for stock consultation and informal sharing may have partly accounted for the success achieved by IEA countries in coping with the oil shortfall resulting from the Iran-Iraq war during the latter part of 1980 and the early months of 1981. Observers differ about this point. Some contend that the principal factor underlying the oil companies' response to the latest disruption was not these systems but rather that oil company stocks were at high levels when the war began. Other factors have also had an important effect--to a point that the world oil market is now characterized by a glut even though the war between Iran and Iraq continues. Among these are:

--IEA oil consumption has declined substantially (about 7.5 percent in 1980 compared to 1979) as a result of higher oil prices, reduced economic growth, and the continuing impact of energy policies introduced since 1973-1974;

--increased oil exports by Iraq and Iran made possible by growing oil production (from 1.1 MMBD in the fourth quarter of 1980 to 2.4 MMBD in the first quarter of 1981); and

--increased oil production by some other OPEC countries.

IEA's new initiatives for dealing with disruptions too small to trigger the Emergency Sharing System, especially the informal oil sharing system, raise questions about anti-trust consequences of the initiatives and whether U.S. participation in them is covered by existing legislative authority. These questions are discussed in the GAO report on the IEA referred to earlier in this chapter.

CONCLUSIONS

The United States was the moving force in establishing the IEA, and since its formation the IEA has been the centerpiece of U.S. efforts to deal with the oil at the international level.

In theory, the IEA Emergency Sharing System reduces U.S. vulnerability to supply interruptions targeted on the United States. Probably more important, it provides considerable potential for reducing the vulnerability of our principal allies to disruption possibilities. It is clear that most of our allies are very vulnerable to oil supply disruptions and that if they are unable to cope with interruptions, U.S. interests could be significantly and adversely affected. Thus, it makes sense for the United States to promote contingency programs that can reduce our and our allies' vulnerability.

The IEA represents a unique effort to deal collectively with a serious international energy problem. Considering that the essential actors in the present international political order are sovereign nation states, the progress made to date by the IEA is no small achievement.

Even so, our review indicates that in practical terms the IEA multilateral emergency programs are characterized by various problems and are not strong enough to deal with the full range of disruption contingencies, and that the U.S. has not effectively integrated its domestic and international contingency planning. As discussed elsewhere in this report, U.S. demand restraint programs are in a shambles; and the Federal Government does not have nor maintain control of emergency reserves anywhere near 90 days of net oil imports.

The greatest potential strength of the IEA approach to supply disruptions lies in the commitment by each member state to maintain emergency reserves equal to 90 days of net oil imports and programs for achieving demand restraint equal to as much as 10 percent of normal oil consumption. These are programs to be implemented individually by the member states. If each member established sound, operational programs capable of fully meeting these commitments, the ability of the various states to cope with supply disruptions would be greatly improved, even if international sharing of supplies never occurred. At the same time, if all members had sound programs in place, the likelihood that members would honor their commitment to share oil supplies with one another would certainly be enhanced.

We believe that the U.S. must take action so that effective multilateral programs can be developed along with domestic programs and these must be successfully integrated for the benefit of both the U.S. and the West in general. In Chapter XIII we outline our principal suggestions for how this can be accomplished.

CHAPTER VIII

DOE'S ORGANIZATION FOR CONTINGENCY PLANNING

Good organization is an essential prerequisite of good planning, which is itself a prerequisite of effective crisis management. Obviously, good organization alone is not sufficient to assure proper and effective planning, but without it planning can be seriously flawed.

On March 4, 1981, we provided a letter report to Senators Charles H. Percy and Edward M. Kennedy on DOE's organization for energy contingency planning and crisis management. 1/ The report detailed specific problems with DOE's then current draft contingency plan and described how these related to organizational weaknesses. The report was based on work conducted to that date as part of this more comprehensive study.

Our March report appeared shortly after DOE announced a reorganization of the entire Department. One important part of that reorganization was centralization of energy contingency planning in a new office of the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness (EP). At that time it was too early to fully analyze the adequacy of the reorganization, since the details had not yet been developed and the new structure had not begun to operate. However, based on information that was then available, we commented on the extent to which we thought the new organization would prove useful.

The broad conclusions of our March report were:

--Preparation of adequate oil import contingency plans is so important to the Nation's security that it should be a top priority item on DOE's agenda.

--The Nation cannot cope with substantial oil import disruptions at present, largely because our contingency plans are not well developed.

--While some progress has been made in contingency planning, substantial organizational deficiencies have held back more rapid progress.

--Contingency planning has had low priority, been overly decentralized, been directed by a person without the authority to command adequate support from other DOE offices, and has not been sufficiently staffed. The current DOE reorganization only

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1/U.S. General Accounting Office, "The Department of Energy's Reorganization of Energy Contingency Planning Holds Promise--But Questions Remain," EMD-81-57, March 4, 1981.

partly addresses these problems. Furthermore, it is questionable whether an adequate organizational structure exists which could effectively manage a crisis.

We recognized that DOE's reorganization had gone some way toward rationalizing the contingency planning process. However, we noted ambiguities regarding the ability of the new organization to develop timely, effective contingency plans. These were whether contingency planning had been adequately centralized, placed at an appropriate level in the authority structure of DOE, and accorded the high priority it deserves.

We also pointed to a related problem, that the process of organizing the new office of the assistant secretary was bound to take time and consequently there was a danger that this process might delay the creation of sound contingency plans. In fact, frequent reorganizations of the Federal Government's contingency planning for energy supply disruptions impeded the preparation of sound plans in the past. Including the creation of DOE in October 1977, four major reorganizations have taken place in less than four years. Each time a reorganization occurs, valuable time is spent devising an organizational substructure, securing and approving office heads and staff, locating appropriate physical facilities, and so forth.

This chapter of our report describes DOE's current organization for contingency planning, and updates our previous conclusions. To a considerable extent, they must remain tentative, partly because development of the new organizational structure is still in process and partly because not that much time has yet elapsed to permit assessment of progress made. In addition, an important factor which presently complicates any examination of progress made under DOE's new organization is the decision of the President's recently formed Cabinet Council on Natural Resources and Environment to examine the issue of energy emergency preparedness, and make recommendations to the President on broad policy considerations requiring a decision by the President.

According to the Acting Assistant Secretary for EP, the Council has been actively involved in the emergency preparedness area, and through the Council other agencies have become more involved in the process of contingency planning for energy emergency preparedness. A major issue that the Council recently addressed is whether the Administration should support extension of the Emergency Petroleum Allocation Act, scheduled to expire on September 30, 1981. As discussed elsewhere in the report, since 1973 this law has provided the President with authority to impose allocation and price controls on the domestic petroleum market. After examining the issue, the Council recommended in July that the President oppose any new legislation authorizing controls on petroleum markets. At the end of July the DOE Deputy Secretary testified before Congress that this was the position of the Administration.

The fact that the new Administration has been engaged in a review of emergency preparedness policies and at a high interagency level has necessarily impacted on DOE's progress in this area. For example, action on the Office of Energy Contingency Planning's March 23rd draft oil supply interruption contingency plan apparently marked time awaiting new policy guidance from the Administration's high level review.

DOE ORGANIZATION FOR PLANNING

DOE's February 24 reorganization placed nearly all contingency planning and emergency preparedness operations within a single office for the first time. To accomplish this, the Assistant Secretary for EP was created. The Assistant Secretary's mission is to insure that DOE programs are in compliance with environmental safety and health regulations, and to direct the Department's energy emergency and contingency planning effort.

The Assistant Secretary's energy emergency and contingency planning responsibilities are of interest to this report. Concerning these, he inherited the following offices, programs and functions:

--the energy emergency functions of the Economic Regulatory Administration;

--the Office of Oil Supply Security, from the Office of Policy, Planning, and Analysis;

--the Office of Emergency Conservation Programs, from the Assistant Secretary for Conservation and Renewable Energy;

--the Strategic Petroleum Reserve Program, from the Assistant Secretary for Resource Applications (which was abolished);

--the Naval Petroleum and Oil Shale Reserves Program, also from the Assistant Secretary for Resource Applications;

--the Energy Emergency Management Information System, from the Energy Information Administration;

--management oversight of the Gasoline Rationing Preimplementation Project Office, from the Office of the Chief Financial Officer (which was abolished); and,

--the Emergency Coordination/Continuity of Government function from the Assistant Secretary for Defense Programs.

The Assistant Secretary reports to the Secretary of Energy and Deputy Secretary through the Under Secretary, who is the Chief Operating Officer of the Department.

An organizational structure and mission and function statements have been approved for the Assistant Secretary for EP down through the deputy assistant secretary, office, and division level. Figure 1 shows the organization to the office level. In terms of contingency planning and emergency preparedness, the relevant offices are the Deputy Assistant Secretary for Energy Emergencies, the Deputy Assistant Secretary for Strategic Petroleum Reserve, and the Office of Naval Petroleum and Oil Shale Reserves. Of these, the former is the most important in terms of broad, comprehensive planning and program operations responsibilities. The latter two are discrete programs, which also have planning responsibilities in their respective program areas. The SPR, of course, is a highly complex program, which in terms of expenditures dwarfs all of the other emergency preparedness programs.

The Deputy Assistant Secretary for Energy Emergencies

The Deputy Assistant Secretary for Energy Emergencies is responsible for:

--coordinating DOE's emergency preparedness planning and emergency operations activities and for assuring that DOE has contingency plans available to respond to energy emergencies and to develop action plans for use during emergencies.

--supporting the Assistant Secretary in coordinating DOE's response efforts during an emergency.

--maintaining current and projected energy price and supply information and monitoring energy production and marketing activities.

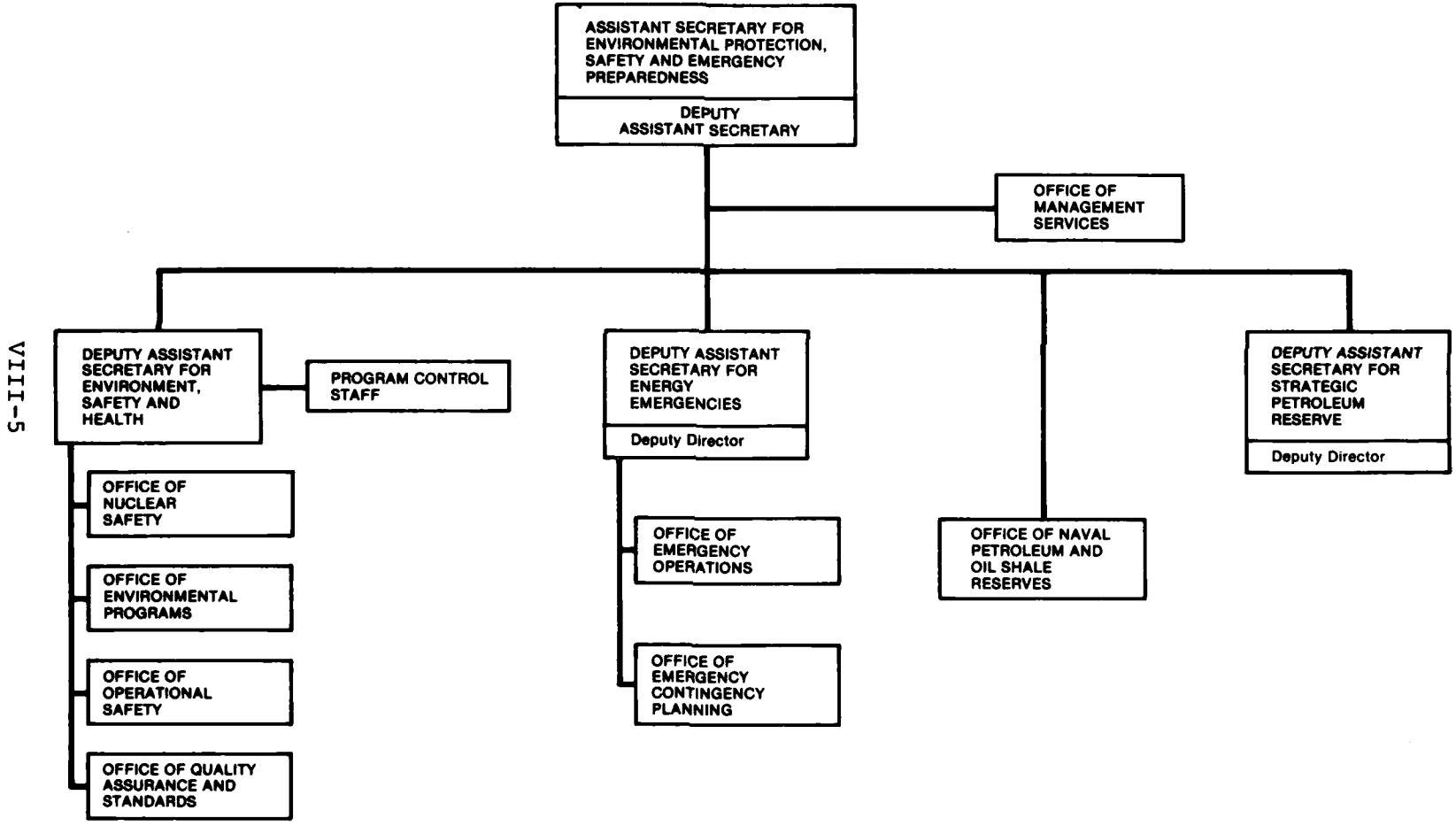
--developing and implementing necessary systems and facilities needed to coordinate communications and operations during emergencies, including providing accurate and timely information to State and local governments.

--evaluating the national security and defense implications of energy emergencies and developing plans to ensure that defense energy requirements are met.

--maintaining liaison and coordination with other Federal agencies, State and local governments, and the private sector to assure that these entities participate in and are informed on the energy emergency planning activities of the DOE.

FIGURE 1

ORGANIZATION OF THE OFFICE OF THE ASSISTANT SECRETARY FOR ENVIRONMENTAL PROTECTION, SAFETY, AND EMERGENCY PREPAREDNESS



To accomplish these responsibilities, the Office of the Deputy Assistant Secretary for Energy Emergencies is organized into two subordinate offices, the Office of Emergency Operations and the Office of Emergency Contingency Planning. As the titles indicate, the former is primarily an operations and the latter a planning office. Each of these offices is organized into two divisions. The entire structure is described in the appendix to this chapter.

The Deputy Assistant Secretary for the Strategic Petroleum Reserve

The Deputy Assistant Secretary for the SPR is responsible for acquiring and storing petroleum for the SPR and for establishing procedures for SPR drawdown and distribution. He provides guidance to the Secretary of Energy and to the Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness on matters relating to the SPR.

The Office of the Deputy Assistant Secretary for the SPR is organized into four divisions. Of these the principal division for contingency planning aspects of the SPR is the Strategic Planning and Analysis Division. The other three divisions are primarily concerned with various aspects of implementation. Our discussion is limited to the former.

The Strategic Planning and Analysis Division provides overall planning support to the Deputy Assistant Secretary--including evaluation and policy advice on a range of SPR issues, such as SPR size, configuration, crude oil and petroleum product acquisition strategy, drawdown and distribution planning, drawdown management, fill and refill scheduling, SPR crude oil procurement, economic impacts, costbenefits studies, and lease-purchase evaluation. It provides policy, planning, and analytical assistance to SPR staff in the preparation of multi-year program plans, integrated SPR development plans, and requirements. The division coordinates SPR inputs to DOE emergency response plans.

Office of Naval Petroleum and Oil Shale Reserves

The Office of Naval Petroleum and Oil Shale Reserves manages the Naval Petroleum and Oil Shale Reserves, and ensures that the government derives maximum economic and maximum energy security benefits from them.

The Office is organized into five principal components. Of these the Policy, Planning, and Analysis Division has principal responsibility for ensuring that the Naval Petroleum and Oil Shale Reserve programs are effectively planned, developed, and implemented to achieve their missions. Among but not inclusive of its functions are: (1) to develop and maintain plans for use of Naval Petroleum Reserve oil in a national emergency and Naval Petroleum Reserve aspects of the SPR fill plan; and (2)

monitor and assess the policy and planning activities of other DOE offices which relate to it, including energy emergency response plans and assessment of U.S. defense vulnerability to interruptions of petroleum supplies.

Energy Emergency Preparedness Steering Committee

On April 13, 1981, the Assistant Secretary briefed the Secretary of Energy on emergency preparedness. Following the briefing, and at the direction of the Secretary, the Under Secretary established an Energy Emergency Preparedness Steering Committee of top DOE officials to ensure Department-wide input into contingency planning and the development of operational strategies for implementing plans. It is chaired by the Assistant Secretary for EP.

The Steering Committee was given several assignments:

--to identify and recommend resolution of principal emergency preparedness issues;

--to define and coordinate the roles of State and local governments and the private sector in energy emergency preparedness; and

--to prepare an energy emergency preparedness agenda for DOE.

EVALUATION OF DOE ORGANIZATION FOR PLANNING

For reasons discussed earlier in this chapter it is still too early to perform an in-depth evaluation of the adequacy of DOE's latest organization for contingency planning. Additionally, a full evaluation would have to examine the relationship between DOE and the Cabinet Council on Natural Resources and Environment, which has been engaged in a review of energy emergency preparedness. Such an examination goes well beyond the scope of this report.

Consequently, our assessment of DOE's latest organization for planning is preliminary in nature. The areas discussed include centralization, authority, and priority. In our March 23 report we noted that it was not clear whether the February 24th reorganization would fully deal with these problems. Despite the passage of 6 months, it is still not clear.

Centralization

Centralization of contingency planning in a single office helps ensure that the required plans are developed, that they are complementary, and that in the aggregate they are adequate to deal with the energy emergency contingencies which must be faced. Centralization promotes timeliness and quality control

by eliminating dependence on other offices which may see contingency planning as a lower priority than their ongoing programs. At the same time, it clearly establishes just where responsibility lies for success in contingency planning.

In our previous report we recognized that the reorganization appeared to go far toward overcoming the lack of adequate centralization. The structure which has been devised since then for incorporating nearly all major contingency planning and operations functions and responsibilities under the Assistant Secretary for EP further confirms that view. Clearly, the new Assistant Secretary has most of the functions and responsibilities under his control, and thus seems well positioned to direct the development of coherent and integrated contingency plans for dealing with oil supply and other energy disruptions.

The action by the Secretary in mid-April establishing the Energy Emergency Preparedness Steering Committee, and the Under Secretary's directive that the Committee identify and recommend resolution of principal emergency preparedness issues and prepare an energy emergency preparedness agenda are additional positive developments. Because members of the Committee are high officials, and because the Committee has significant responsibilities, it can ensure that the various programs of the Department are taken into account in the formulation of contingency plans. To the extent that the Assistant Secretary for EP needs the help of other major DOE offices, the Committee provides an organized forum for him to enunciate his needs and secure the support of other Committee members.

We do, however, have one reservation about the adequacy of centralization. In our March report we pointed out that DOE's reorganization did not indicate that responsibility for contingency planning involving international programs and activities had been transferred to the new Assistant Secretary. Work performed to date still indicates uncertainty about which DOE office is ultimately responsible for planning and program implementation. For example, according to mission and function statements, the Assistant Secretary for EP (1) maintains liaison with the International Energy Agency (IEA) and the North Atlantic Treaty Organization (NATO) regarding energy emergency preparedness matters; (2) serves as the U.S. representative on the NATO Petroleum Planning Committee, and (3) coordinates the operations of the United States in exercises and other activities of the IEA. According to the Office of the Assistant Secretary for International Affairs it (1) coordinates the formulation of U.S. positions on issues addressed by the IEA, including emergency preparedness, to ensure coordination between international and domestic planning; (2) provides representation to IEA meetings; and (3) participates in the oil supply contingency activities of the NATO Petroleum Planning Committee. It seems obvious from a reading of these statements that the potential for overlap and consequent problems arising is real unless clear understandings exist between the

two offices as to what their specific duties and responsibilities are.

Authority

Authority is needed to direct other offices to contribute staff, resources, and whatever else is needed to get the job done. An office with "clout" also tends to attract effective staff who thrive on being where the action is. In our March report we noted that responsibility for contingency planning in DOE had never been at a level of authority that permitted mobilizing the staff and resources required. Regarding DOE's February 24 reorganization we said the issue of authority arises in two ways--whether the level of authority of the head of the program is adequate and whether the authority structure within the office of the assistant secretary will foster an efficient planning process.

On the issue of the level of authority, we noted that the person heading the new contingency planning operation will be at roughly the same authority level as was the case prior to the reorganization. Regarding the latter, DOE's Office of Energy Contingency Planning reported to ERA's Deputy Administrator for Operations and Emergency Management, who had overall responsibility for the contingency planning function in the Department. We were advised by a DOE official in early March 1981 that under the new organization a deputy assistant secretary would probably be put in charge of the contingency planning function.

In our March report we said that while in

> "theory there is nothing inherently wrong with this arrangement, contingency planning has never been carried out successfully at this level in the past. The fact that contingency planning cuts across so many policy and functional lines suggests to us that a higher level of authority may be desirable. One way to facilitate department-wide cooperation, more visible priority, and possibly more centralization would be to have the Under Secretary of Energy assume direct responsibility for contingency planning and crisis management. Such a reorganization could well result in quicker mobilization of the Department's resources."

We are pleased to report that the organizational developments which have occurred since then, combined with the initial reorganization itself, have alleviated much of our concern in this area. Under the organization, the Deputy Assistant Secretary for Energy Emergencies' sole responsibilities are in the emergency preparedness area, including both contingency planning and operations. Prior to the reorganization, the ERA Deputy Administrator for Operations and Emergency Management also had responsibilities in the non-emergency area.

In addition, the new Deputy Assistant Secretary for Energy Emergencies has more comprehensive and direct authority over both contingency planning and emergency preparedness operations than did the ERA Deputy Administrator. Finally, while under the new organization both the Deputy Assistant Secretary for the Strategic Petroleum Reserve and the Office of Naval Petroleum and Oil Shale Reserves are not under the control of the Deputy Assistant Secretary for Emergency Preparedness, all three are under the authority of the Assistant Secretary for EP. Prior to the February 24 reorganization there were several important contingency planning and operations functions that were not accountable to a single official at the level of an Assistant Secretary or Administrator.

We also believe that the Secretary's decision to establish an Energy Emergency Preparedness Steering Committee to provide for Department-wide input into contingency planning and which reports to the Under Secretary can help facilitate department-wide cooperation.

On the other authority issue--whether the authority structure within the new Assistant Secretary's office is appropriate--we noted in March that though planning offices and operating programs had been transferred, DOE had not yet decided precisely how these will be organized. We said that while there were many possibilities, we would urge that one person be put in charge of all aspects of contingency planning. We also said that it would be confusing and inefficient to combine operating programs and contingency planning under the same people, since experience has shown that planning often takes a back seat when put in competition with the demands of ongoing programs.

Based on the organizational decisions that have since been made, we think substantial progress has been made on this front. As described earlier in this chapter, the Deputy Assistant Secretary for Energy Emergencies is organized into two offices--Emergency Operations and Emergency Contingency Planning. The former is primarily in charge of operational functions and the latter planning activities. One potential problem area concerns the fact that both the Deputy Assistant Secretary for Strategic Petroleum Reserve and the Office of Naval Petroleum and Oil Shale Reserves have contingency planning functions but are not under the authority of the Deputy Assistant Secretary for Energy Emergencies. However, we were advised by the Office of Emergency Contingency Planning that it alone, and not these offices, has a national contingency planning responsibility. Also, these offices are represented on a working subcommittee of the Energy Emergency Preparedness Steering Committee. Of course, the Assistant Secretary for EP is in charge of all these offices, and others as well. It is important that the Office of Contingency Planning and the Deputy Assistant Secretary for Energy Emergencies work closely with the Deputy Assistant Secretary for the SPR and Naval Petroleum and Oil Shale Reserves offices in contingency planning. The Assistant Secretary for EP must assure that this takes place.

Priority

In our earlier report we concluded that "DOE's contingency planning deficiencies reflect continuing organizational problems. The fact that no comprehensive or individual action plans are finished and that many areas are not covered indicates that the subject has not been given sufficiently high DOE priority." We said that whether the new DOE structure will supply sufficient priority was unclear, since the new office was still being organized.

In July 1981, DOE stated that a new approach to emergency preparedness was called for, and that the approach envisaged by the administration encompassed the following features:

--primary reliance on market forces to determine the price and allocation of energy supplies, even during an emergency;

--rapid growth in the Strategic Petroleum Reserve, and simultaneous removal of factors that have discouraged private firms from building their own emergency oil stockpiles;

--developing criteria and mechanisms for making the strategic reserve available for use in case of emergencies;

--encouraging industry and utilities to install dual-fuel capability so that they could switch away from oil during a disruption;

--advance planning to permit surge domestic energy production during a disruption without economic penalties;

--international coordination of emergency response.

Many of these elements were espoused by the previous administration as well.

A principal message of the rest of our report is that adequate plans and standby programs do not exist to deal with oil supply emergencies. Our report's conclusions and recommendations are also in general agreement with the features cited above, but our findings are that current plans and standby programs in these and other areas cannot be counted on to ensure that the Nation can cope with substantial oil supply disruptions.

We believe that the priority of emergency preparedness has been upgraded. The fact that the new administration quickly reorganized the contingency planning function is an indication of the high priority which it places on contingency planning. As discussed earlier, we think that the thrust of the reorganization has been in the right direction. We also think that

the attention of the Cabinet Council on Natural Resources and the Environment to key energy emergency preparedness issues is another indication of high priority given to this issue.

On the not so positive side, though, we must point out that although more than seven months have passed since the Administration took office, an Assistant Secretary for EP has not yet been confirmed. As a result, all of the key contingency planning and operations positions under the Assistant Secretary are being filled by acting officials. One individual has been acting in four capacities, three of which concern the most important energy emergency preparedness positions. The latter are the Assistant Secretary for EP, the Principal Deputy Assistant Secretary for EP, and the Deputy Assistant Secretary for Energy Emergencies. This tardiness in assembling an emergency preparedness team may reflect a lack of priority for the area.

In the final analysis, it still remains to be seen if DOE's new organization for contingency planning and the priority attached to it will be sufficient to lead to sound, comprehensive contingency plans and programs.

DETAILED STRUCTURE OF OFFICES REPORTING TO THE DEPUTY ASSISTANT SECRETARY FOR ENERGY EMERGENCIES

The Office of Emergency Operations. This office was authorized at 65 positions for fiscal year 1982 and is organized into two divisions. The first of these is the Emergency Petroleum, Gas, and Solid Fuels Division. It is responsible for conducting market analyses, including maintenance of information on current and projected prices, supply, transportation and storage, crude oil, petroleum products and solid fuels. It is responsible for administering Departmental authorities related to production, supply, transportation and allocation of crude oil, petroleum products, coal and other solid fuels in the event of an energy emergency.

The Division is also responsible for administering the emergency natural gas authorities pursuant to Title III of the Natural Gas Policy Act of 1978 and other Departmental authorities related to production, supply and transportation of natural gas in the event of an energy emergency.

While this is primarily an operating division, it coordinates with the Office of Emergency Contingency Planning in:

--developing plans for the effective utilization and distribution of domestic and worldwide energy supplies to ensure satisfaction of military and priority private user requirements during an energy emergency.

--identifying implementation mechanisms, including military and defense contractor requirements for managing short and long-term fuel supply shortages as required by military contingencies.

--developing standby defense mobilization plans.

--making recommendations to the Office of Emergency Contingency Planning to assist in development of new policies, procedures, and programs to successfully respond to energy emergencies.

The second operations division, Utility Systems and Emergency Communications, also has planning as well as operations functions. It is responsible for DOE programs in the area of electric utility system planning, coordination, and emergency response. The Division administers provisions of the Federal Power Act delegated by the Secretary. Such provisions include programs relating to long-range utility planning, system coordination and interconnections designed to assure the reliability of bulk power supply and selected cost-related investigations.

The Division is further responsible for planning and implementing necessary systems, procedures and facilities needed to

coordinate communications and operations during emergencies. A communication center for the collection of data from the States and industry is responsible for assessing the significance of incoming reports and for providing early warning of impending localized and regional supply and distribution abnormalities. In an emergency situation, it provides the cadre for the operation of the center during energy emergencies.

The Office of Emergency Contingency Planning. This office, authorized at 36 positions for fiscal year 1982, is also organized into two divisions. The first is the Emergency Strategies and Scenario Development Division (ESSD). It is responsible for the development of new initiatives and the analysis of policy issues associated with energy supply emergencies. It is concerned with shortages of any energy source, including oil, coal, and natural gas. It is responsible for the legislative followup of new initiatives to obtain necessary authorities and recommendations for use during energy supply emergencies.

The division is also responsible for developing scenarios profiling energy emergencies in connection with the development of comprehensive response plans. These scenarios would include definition of the type and extent of disruption, affected area, duration, and supply distribution systems likely to be affected. The division determines and analyzes the social, economic, supply and demand impacts of the various scenarios and response possibilities. It evaluates the probable consequences of planned responses on other countries, Federal and State governments, and individuals, and conducts post-emergency analyses when appropriate.

The division is further responsible for coordinating matters related to energy emergency response planning with other DOE components, other Federal agencies, State and local governments, and the private sector. It develops and conducts tests of DOE's emergency response plans.

The second division in the Office of Emergency Contingency Planning is National Security and Plans Development (NSPD). It is responsible for evaluating defense and defense contractor energy requirements during peacetime energy emergencies and conventional and nuclear war; evaluating defense and national security implications of energy emergencies; developing and maintaining continuity of Government and National Emergency Plans.

The division is also responsible for defining responses to various energy emergency scenarios and identifying those entities responsible for taking approved actions and the time phasing required to implement the necessary actions. Responsibility includes consideration of specific actions to be taken by international, Federal and State, and local agencies, as well as industry and individuals.

The division is further responsible for developing national emergency energy conservation contingency plans.

The division maintains liaison with the National Security Council, Department of State, Department of Defense, the Federal Emergency Management Agency, and the NATO Petroleum Planning Committee on matters relating to energy emergency preparedness. The Division coordinates the assignments of the Assistant Secretary for EP relating to the International Energy Agency.

It is apparent that the functions of the National Security and Plans Development Division (NSPD) and the Emergency Strategies and Scenario Development Division (ESSD) can overlap in important ways, since the former is responsible for energy emergencies that reach sufficient magnitude to impact on defense and national security considerations. Accordingly, ESSD is responsible for coordinating with NSPD in developing implementation plans for emergency response strategies, and to provide strategic guidance, longer-term analysis, and new emergency responses to add to the range of options developed and maintained by NSPD. It provides support to the NSPD in the analysis of the relationship between oil import interruptions and national security, and ensures energy emergency policy decisions are consistent with national security policy developed by other agencies. It monitors and evaluates emergency response policies that require international coordination, and in cooperation with DOE International Affairs and State Department, evaluates and develops new policies.

We were recently advised by DOE officials that organization of the Office of Emergency Contingency Planning is still in the process of being developed. Draft plans now exist for the office down to the branch level. We were also advised that the ESSD has more of a supporting analytical role to play, while the NSSD's role is more one of preparing plans per se.

Gasoline Rationing Pre-Implementation Project Office. The DAS for Energy Emergencies is also responsible for management oversight of this office which is being phased out.

CHAPTER IX

OPTIONS FOR INCREASING OIL SUPPLIES

The potential for increasing oil supplies to cushion the effects of a supply disruption is large. DOE can take several actions to help realize that potential. First, it should develop a plan to temporarily increase domestic oil production above maximum efficient rates. To do this it needs to update maximum and temporary emergency production rates on a field-by-field basis, identify constraints to achieving the emergency rates, and develop initiatives to overcome these constraints. These actions are discussed in Chapter IV. Second, DOE should revise its SPR oil acquisition strategy to provide a greater proportion of secure supplies. Finally, DOE should begin establishing a private petroleum reserve program to supplement the SPR. Options to consider include mandating an industry stock set-aside, providing financial incentives to encourage higher private stock levels, or establishing a quasi-public corporation to finance and maintain additional stocks.

STOCK MANAGEMENT OPTIONS

During 1980 private stocks reached record levels. These stocks, and IEA encouragement that they be drawn down, were largely responsible for avoiding panic late in the year when the world lost about 4 MMBD of crude oil due to the Iran-Iraq war. However, despite the demonstrated advantages of high stock levels, DOE has no program or plan to encourage or require private stock buildup.

Recent analysis of past and current behavior by petroleum firms indicates that they cannot be counted on to store, at their own expense for any length of time, significant quantities of oil in anticipation of major supply interruptions. The high storage costs may not be justified by the possibility, in industry's view, that a severe shortage will occur. Furthermore, the national benefits of high stock levels, such as a deterrent to political disruptions and lower prices during a disruption, are benefits which do not fully accrue to the individual companies. Also, industry generally expects that, in a severe shortage, stored petroleum will be subject to Federal allocation and price controls, depriving the inventory holder of access to, as well as profits from, surplus stocks. In addition, high interest rates and environmental restrictions on hydrocarbon emissions increase the costs of new tank construction built to hold stocks.

Because of the benefits which accrue to the Nation as a whole in maintaining high stock levels, and because of the disincentives for industry to maintain them, we believe it is appropriate for the Government to ensure that industry hold extra stocks for emergency use, or at least provide incentives for them to do so. At least 3 options are available for establishing a private petroleum reserve including:

--requiring, through existing EPCA authority, the petroleum industry to set aside a certain level of stocks;

--encouraging industry to maintain high stock levels through financial incentives; and

--establishing a quasi-public corporation to purchase and/or store stocks.

These options are not mutually exclusive. To enhance its ability to reduce shortages in the event of a supply disruption, DOE should consider adopting a mix of the above, each with its own goals, drawdown strategies, and financing arrangements. According to a November 1980 study by DOE's Assistant Secretary for Policy and Evaluation, "Reducing U.S. Oil Vulnerability--Energy Policy for the 1980's," a program implemented expeditiously and efficiently could result in privately held reserves of 350 MMB by 1985. That amount far exceeds the size of the current SPR, which stood at about 177 MMB in mid-August 1981.

Require a stock set-aside

The EPCA authorizes the Secretary of Energy to establish an Industrial Petroleum Reserve (IPR) as part of the Strategic Petroleum Reserve. To date this authority has not been used. According to the Act, the Secretary may require each petroleum importer and refiner to acquire, store, and maintain up to 3 percent of its last calendar year's imports or refinery throughput in "readily available inventories," defined as products which can be distributed or used without affecting the ability of a firm to operate normally. DOE estimates that a 3-percent requirement would result in an IPR of about 200 MMB, based on 1979 throughput and imports.

If an IPR is established, the Secretary may exempt from any requirement any firm that would incur "special hardship, inequity or unfair distribution of burdens." Industry-owned oil may be stored in surplus Government facilities to remedy any refiner or importer inequities. The Secretary could order IPR oil drawn down and distributed just like SPR oil in accordance with an SPR distribution plan, or he may permit the firms to dispose of the oil in other ways. This might include allowing refiners or importers to use their IPR oil at their discretion during an emergency, or requiring the firms to draw down their IPR stocks as part of a general stock drawdown applicable to all stocks owned by the firm.

Officials of DOE's former Office of Policy and Evaluation believe, however, that use of EPCA authority would generate many legal challenges because of the different effects on firms in meeting the same requirement, of the Fifth Amendment stricture against uncompensated taking of private property, and of the environmental consequences of building additional storage. The Office believed, though, that these challenges would not significantly delay

initiation of IPR storage unless an injunction were issued on the grounds of an inadequate Environmental Impact Statement, or if construction permits for storage facilities, required under the Clean Air and Water Acts, were delayed.

In any case, an EPCA-required IPR might have little effect on stock levels if inventories were stored in company facilities. Unless a system were carefully designed and monitored, it might be easy for oil companies to comply with IPR requirements on paper without storing a single barrel of oil more than they would without the requirement. Since inventories are not static, reported inventory levels would have to represent some sort of "average" at a particular time (e.g., the end of the month). Companies could adjust their end-of-the-month stocks to comply with the requirement without keeping any more oil in storage over the entire time period. Segregated storage would, therefore, likely be the only feasible means of assuring incremental oil storage through an IPR program. Numerous adjustments and exemptions might have to be made in order to comply with the EPCA requirement that an IPR be implemented so as to maintain an "economically sound and competitive petroleum industry," and "to avoid inequitable economic impacts on refiners and importers."

The National Petroleum Council believes that the existing petroleum inventory system in the United States was not designed to hold a large strategic stockpile. It believes that mandating a portion of existing industry inventories for strategic reserves, without providing for additional oil, will have a disruptive effect on the efficient operation of the petroleum distribution system. The Council also fears that a mandated system would direct capital from investments in oil exploration and production, coal, and synthetics. While we agree that the existing storage system was not designed to hold emergency reserves, we believe, as discussed in Chapter III, that the system nonetheless can potentially provide extra stocks during an emergency.

Encourage high stock levels

According to DOE officials, several options are available to encourage U.S. industry to maintain stocks above normal levels and to increase storage capacity. For example, a tax credit for a percentage of construction costs could be used to construct new storage capacity. To encourage the holding of stocks, subsidies, tax credits, or tax reductions could be used. Subsidized stocks would probably have to be segregated from normal working stocks to ensure that they were always available and capable of being monitored.

The Office of Policy and Evaluation believes that a tax credit of 100 percent, up to $12 per barrel, would completely cover new construction costs for steel tanks, and would cost the Treasury up to $4.2 billion for 350 MMB of storage capacity. A subsidy of $4.60 per barrel per year would completely cover the opportunity cost of holding oil, assuming a $31 per barrel price of oil and a 15-percent cost of capital. Total cost for 350 MMB

stored would be $1.6 billion per year. These are upper bound estimates. To the extent that industry expects to realize benefits in addition to the subsidy under the stockpile program (or that the cost of capital is less), a smaller subsidy would encourage the creation of the 350 MMB stockpile.

Encouraging high stock levels has a number of advantages which less voluntary approaches do not possess, including ease of implementation and a reduced likelihood of provoking producer retaliation, since the program would be less conspicuous than a mandatory one. The disadvantages of a voluntary scheme include the political problems involved in passing a law that could be labeled a "give-away to the oil companies," the difficulty in monitoring private stocks, and the uncertainty surrounding the levels of incentives that would be required to bring reserves up to desired levels.

Establish an Industrial Petroleum Reserve Corporation

To establish an IPR, Congress could enact legislation authorizing a quasi-public corporation consisting of all U.S. refiners and importers. A similar entity has been in operation in West Germany since 1978, and has been an acceptable means to establish an industry stockpile. Details of its operations are discussed in the next section.

The purpose of the U.S. corporation would be to help finance the acquisition of reserves held by private oil companies. Its reserves would be segregated from the companies' own working reserves and could only be drawn down at the direction of the Corporation's Board of Directors, composed of company and Government representatives.

The main advantage of the IPR Corporation would be to remove capital costs of storage from the books of the industry, thus eliminating one of the industry's main objections to the IPR. Ways to finance the corporation include collecting fees from the oil companies based on product sales, which could be passed on to consumers in the form of higher prices; sales taxes; or sale of bonds to the public. However, according to the former Office of Policy and Evaluation, considerable discussion would undoubtedly center around the size and form of the U.S. Government loan guarantees that would be needed to establish the credit worthiness of the IPR Corporation. Environmental challenges are expected to the degree that new storage facilities would have to be built.

Lessons learned from other countries 1/

Of the major oil-importing companies, only the United States has an emergency oil reserve which is separate from commercial

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1/The following information is based on: Deese, David A. and Nye, Joseph S., ed. Energy and Security, (Cambridge: Ballinger, 1981) and Krapels, Edward W., Oil Supply Security, (Wash. D.C.: Johns Hopkins University Press 1980).

inventories and entirely owned by the government. In Japan and Germany, some but not all emergency reserves are held separately from commercial inventories and, therefore, both the governments and oil industries in each country own some portion of the emergency reserves. These combined reserve systems appear particularly beneficial in preparing for oil shortfalls because they combine two pools of reserves. The government-owned reserve is under the direct control of the government, and serves as a minimum reserve. The reserves held by the industry are an additional supply above that known to be present in the government reserve--a type of buffer stock.

Most Japanese emergency reserves, unlike those of the United States, are held in the storage systems of the oil companies. Experts contend that such a system would lead to numerous problems in the United States. The traditionally close relationship between government and industry in Japan makes this less difficult than it would be for the United States. While the Japanese government has the legal authority to impose mandatory requirements on the industry in the event of a crisis, it depends more generally on "guidance" to the industry to achieve its goals.

The Japanese Ministry of International Trade and Industry annually determines stockpile goals for the next four years and requires importers and refiners to submit implementation plans which it has the authority to revise. The government encourages private stock build-ups through various incentives to industry, including loans for construction of new storage facilities, loans and interest subsidies for buying crude oil to be stockpiled, a lower fixed assets tax on storage facilities, and accelerated depreciation of storage facilities. While these measures help relieve the financial burden of stock holding, the costs to the industry remain considerable.

To lessen further the burden of holding reserves, the Japanese government commissioned the state-owned company--the Japan National Oil Company--to establish an additional government stockpile. In 1980, this government stockpile held roughly 7 days' worth of imports or 33 million barrels.

As noted, energy experts contend that this type of system would be difficult to establish in the United States. The U.S. Government may not be able to rely on persuasion or "guidance" to the oil industry to the extent that the Japanese government can. The most notable and relevant aspect of the Japanese system for the United States may be the concept of an additional private oil stockpile held by the industry and encouraged by various incentives.

The West German emergency oil reserve system may also be instructive for the United States. The German government has traditionally preferred a minimum of regulation of the domestic oil industry and has shown a strong preference for a market economy under a private enterprise system. The West German stockpiling system operates largely under coordinated industrial management.

West German emergency stockpiles consist of crude oil and products held by three separate groups: importers and refiners, the German government, and an industry consortium. A 1979 law requires refiners to hold the equivalent of 25 days of their production from imported crude in the prior year. The government and the special industry consortium are required to hold a combined total of 65 days of oil use.

The industry consortium was established in 1978. Membership is mandatory for all companies that import or refine oil in West Germany. The consortium arranges for oil storage facilities for the emergency stockpiles and is responsible for managing the stocks. As noted earlier, one of the most important aspects of the program is the special financial arrangement that removes obligatory (emergency) stocks from the balance sheets of the oil companies. They do not have to borrow money or use retained earnings to carry this "dead asset." The consortium is completely debt-financed, with only the normal government loan guarantees given to any German company. Interest on loans is paid through "storage taxes" on petroleum product sales collected from the individual companies. The arrangement, in addition to permitting the oil industry to remove these reserves from their balance sheets, also separates the oil administratively so that government authorities can constantly monitor emergency reserve levels.

The overall total of 90 days of compulsory stocks designated by the West German program is, according to some analysts, stricter and more meaningful than is the system in other countries because it specifically excludes all commercial inventories. Therefore, there is a greater awareness at any given time of the volume of reserves available for emergency use.

In addition to compulsory stockpiling, the German government has asked consumers to hold some portion of their own stocks for emergency use. Likewise, government ministries, industries, commercial ventures, and other productive sectors of the West German economy are asked to maintain emergency stockpiles of at least 14 days usage.

The West German emergency reserve system offers many features from which the United States might also benefit in an oil shortfall. While the West German system--like those of most other importing industrial countries--involves a degree of government involvement and mandatory requirements which may be unattractive to many in the United States, such involvement appears to give the government a greater amount of certainty and control over the volume of reserves available for an emergency. The West German system appears to combine the benefits of both a government- and an industry-held reserve while minimizing costs by including an industry consortium as an additional reserve holder. The special consortium, as noted above, lowers the cost to the industry of holding these stocks--making such an emergency stockpiling more attractive--and makes industry emergency stocks more easily monitored by the government.

Conclusions

Through September 30, 1981, DOE has authority to require adjustments in private stock levels during an impending or existing supply shortage, and is developing standby plans to be able to draw down those stocks when needed. However, despite the demonstrated advantages of high stock levels, DOE has no program or plan to encourage or require the build-up of private stocks before a shortage. Three options to do so have been addressed here: requiring a 3-percent set-aside through existing EPCA authority, encouraging high stock levels with financial incentives, and establishing a quasi-public corporation to help finance the acquisition and storage of stocks. These options are not mutually exclusive. In fact, considering the potential to fairly quickly and greatly increase U.S. strategic reserves, the best option may be a combination of them. Each should have its own drawdown strategies and financing arrangements.

In December 1980 DOE's Office of Oil and Gas noted that some form of an IPR was desirable, and recommended pursuing the options of a government/industry corporation and a private stock subsidy. However, they also recommended against making any decisions until further study was done.

With the change in administration, though, little action has been taken on the recommendations. DOE has begun to "re-study" the options and may, in particular, be focusing on how to maintain current inventory levels before they decline further. We believe DOE should take immediate action to provide for some kind of an private stockpile program. By temporarily increasing domestic oil supplies, oil stocks, in the form of both an IPR and SPR, are potentially the most effective means to reduce the costs of an oil supply disruption or price spiral.

OPTIONS FOR FILLING THE SPR

To improve the Nation's preparedness for oil disruptions, DOE should improve its oil acquisition strategy for the SPR to provide a greater portion of secure oil supplies. SPR fill should not be interrupted while long-term financing is sought.

Through August 20, 1981, DOE had contracted for and expected delivery on about 110 MMB of oil for fiscal year 1981. 1/ This is great progress over earlier years. However, over half of that oil, 66.8 MMB, was purchased through an "open continuous solicitation." We believe these spot market purchases present at least two major problems. First, they leave SPR fill subject to the uncertainties of the international oil market. Although there currently is a glut of oil, the situation could change quickly. If the market were

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1/See U.S. General Accounting Office, "Status of Strategic Petroleum Reserve Activities--August 1981," EMD-81-136, August 28, 1981.

to tighten, probably the best that DOE could expect is offers for sale, if any, at very high prices. DOE has, in the past, shown itself unwilling to pay high spot prices, as demonstrated by its suspending of all purchases in early 1979 (see Chapter III). A repeat of this pattern would mean no oil being purchased for the SPR.

This leads us to the second problem with reliance on spot market purchases. After the United States suspended SPR purchases in 1979, resuming purchases received high visibility. Therefore, even after the market had loosened, DOE faced political pressures from both allies and producing countries, against resuming SPR fill. It was not until Congress required DOE to fill the SPR that purchases were resumed. If DOE again had to stop buying for the SPR because of its reliance on the spot market and high spot prices, it could again face pressures when trying to resume fill. We believe that SPR purchases should be maintained, even if at only a token amount, except in very severe emergencies.

DOE has recently taken two steps to acquire SPR oil for fiscal year 1982 and beyond, a solicitation for 36.5 MMB and a 5-year contract with the Mexican state oil company for up to 110 MMB. These will probably provide greater supply security than spot market purchases. However, they still leave SPR fill subject to the vagaries of the international oil market. Further, DOE is not planning on obtaining any oil in exchange for the Government's own NPR oil and so is forsaking this secure source of oil. Thus, despite the fiscal year 1982 improvements in oil acquisition strategy, we believe DOE should place greater reliance on more secure oil sources. There are several such sources, all of which are more secure than the spot market or foreign oil purchases. These include Alaska North Slope oil, Federal royalty oil, and mandatory allocations from the oil companies. Filling the SPR should be considered a part of U.S. base demand, and should not be cut back first under tight market conditions. Adopting such a strategy would demonstrate greater U.S. resolve to prepare itself for emergencies.

In addition, we think the SPR should be filled as fast as practicable. Fiscal year 1981 purchases through mid-August 1981, averaged 300 MBD--a vast improvement over prior years. U.S. vulnerability to supply disruptions and the poor state of readiness of U.S. response measures make it imperative that DOE fill the SPR quickly. The Secretary of Energy agrees. Also, DOE's fiscal year 1981 appropriations legislation provided for DOE to seek to fill the SPR at an average rate of 300 MBD, or until all funds are used. The Omnibus Budget Reconciliation Act of 1981 provides for a 1982 average fill rate of 300 MBD. If DOE were to maintain that rate beyond mid-1982, however, it will need to increase or accelerate acquistion of storage capacity. The Reconcilation Act advises the administration, therefore, to consider leasing facilities to increase storage capacity.

Alaska North Slope oil

DOE could obtain Alaska North Slope (ANS) crude oil in at least 2 ways--through the companies who own and distribute it or through negotiations with the Alaska Government for the State's royalty share of oil. DOE has recently done the former and is exploring ways to do the latter.

ANS crude oil production is privately owned and distributed primarily by major U.S. companies and their subsidiaries. DOE has awarded SPR contracts during fiscal year 1981 for about 26 MMB of ANS crude oil. About 5.4 MMB of this has been through a competitive exchange of NPR oil for an equal amount of oil delivered to the SPR; the remainder has been through spot market purchases.

Because significant production occurs on State-owned lands, the State of Alaska is entitled to a 12.5 percent royalty share of that crude oil production in currency or kind. In addition to receiving privately owned ANS crude oil, DOE should continue to attempt to acquire some of the State of Alaska's royalty oil (from 40 to 140 MBD) through direct negotiation with the State Government.

Use of ANS oil for the SPR

For the first time, in October 1980, the administration broadened specifications for SPR oil to allow companies to offer ANS and other heavier oil 1/ for delivery to the SPR.

As stated in our March 22, 1979, report, "Information on Department of Energy's Management of the Strategic Petroleum Reserve" (EMD-79-49), DOE had not used ANS oil in the past because

--a sufficient number of U.S. tankers did not exist to transport ANS oil to SPR sites. U.S. tankers have to be used to comply with the Merchant Marine Act of 1920, which requires that U.S. vessels be used to transport commodities between U.S. ports; and

--API gravity and expected refinery yields did not meet existing SPR specifications.

1/Light and heavy oil are defined using American Petroleum Institute (API) gravity. API gravity is the measure of the mass of the fluid relative to water which ranges from about 10 degrees for very heavy crude oils to 45 degrees for very light crude oils. ANS is about 26 degrees API as opposed to 30 to 45 degrees API gravity for other oils stored in the SPR.

In October 1980 we noted that U.S. tankers were now in sufficient supply and were being used to transport 500 MBD of ANS crude oil to the Gulf Coast. 1/

Concerning the quality and refinery yield issue, we reported that DOE officials informed us that they preferred to continue using higher quality oil for the SPR, if available, since they believe that during an oil supply interruption higher quality oil would have a more universal application to U.S. refiners and would provide higher quality product yields. However, they said ANS oil can be used for the SPR, and noted that U.S. refiners have developed a capability to process heavier oil to a greater extent than was anticipated when the quality specifications for the SPR were first developed.

Alaskan royalty oil

The prevailing Alaska State Government policy is that instate use of royalty oil has higher priority than sales to the lower 48 States, but direct sales will be considered if the State can increase its royalty income. According to an Alaskan Government official, the Government is currently entitled to about 175 MBD of royalty oil. Up to 35 MBD is already committed under long-term contract to instate refiners. Another 75 MBD is temporarily committed to the Alaska Oil Company, and will become firm, with an option for an additional 25 MBD beginning in 1986, if the company can meet certain benchmarks for a refinery it is planning to construct. This determination should be made in December 1981. The remainder of the royalty oil has been sold in 17 lots through July 1982.

Several options for obtaining some of this royalty oil may be available to the Federal Government. If the Alaska Oil Company does not meet its conditions, the oil reverts to the State. In that event, DOE or any other party could negotiate for the previously committed 75 MBD. Even if the company meets its milestones and maintains access to the oil, DOE could negotiate with the company to acquire the oil while the refinery is being constructed. Furthermore, after July 1982 the remaining oil now under short-term commitments is potentially available to the Federal Government. DOE has begun to explore use of this royalty oil and has held meetings with State Govenment officials to determine if there is a mutual basis for further negotiation. A DOE official involved in the negotiations said he was told that at least some royalty oil will be available beginning December 1981 or January 1982.

1/U.S. General Accounting Office, "Using Elk Hills and Alaskan North Slope Oil To Supply The Strategic Petroleum Reserve," EMD-81-4, Oct. 21, 1980.

Federal royalty oil

The Federal Government leases off-shore and on-shore Federal lands to exploit their mineral resources. As part of its compensation, the Government receives a royalty which is based on a percentage of the production--normally 16 2/3 percent of production offshore and 12 1/2 percent of production onshore. It has the right to take the royalty oil from most of its leases either in cash or in kind. The Energy Security Act re-enacted the President's authority, originally provided in the EPCA, to use or exchange this oil to fill the SPR. The Act's Conference Committee report went further, and stated that the President should give a high priority to using this oil.

Testifying in April 1980 before the Senate Energy and Natural Resources Committee, Subcommittee on Energy Resources and Materials Production, DOE's Assistant Secretary for Resource Applications stated that 174 MBD of Federal royalty oil could be made available, either directly in kind or indirectly through exchange, for SPR fill within a relatively short time. However, DOE recommended against this option due to (1) the administrative and logistical burden of dealing with approximately 13,000 separate leases under which the oil is produced and (2) potential effects on the small refiners that have historically purchased this oil from the government.

We believe that this administrative burden has been overstated. Furthermore, since oil prices were decontrolled in early 1981, small refiners no longer enjoy price benefits by purchasing royalty oil.

In March 1980, in its "Revised Crude Oil Acquisition Strategy," the SPR Office identified several options for obtaining royalty oil. The first option was the one referred to above, acquiring all royalty oil available in kind, or about 174 MBD. It is true that a significant portion of Federal royalty oil is produced at very low rates from a large number of scattered leases. Acquisition or exchange for this oil might very well entail substantial administrative cost. On the other hand, significant portions of the oil are available from larger leases, are near SPR storage sites, and could be directly transported to the sites. If, for administrative ease, DOE were to purchase from only the larger offshore leases, it would still acquire significant amounts of oil. For example, in October 1980 (the latest month for which data were available) 193 leases produced about 85 percent of the offshore oil available to the Government in kind. Each of these leases produced over 100 BD of royalty oil, and together would have provided DOE with over 71 MBD--26.4 MMB at an annual rate--of secure oil. Obtaining at least some offshore royalty oil for the SPR appears quite feasible administratively.

DOE's second argument against acquiring royalty oil relates to the effects on small refiners. In 1980, for example, small refiners received about 57 percent of Federal royalty oil. With the wellhead value of most royalty oil being controlled at low levels, fears were that the loss of this oil would force these

refiners to obtain crude at higher world prices. In March 1980 DOE estimated that each royalty barrel lost would cost the small refiner an additional $9. Because many of them would not become eligible for DOE's emergency Buy/Sell allocations, DOE stated loss of this oil would clearly seriously affect their economic viability.

However, in January 1981 President Reagan lifted all price controls on domestically produced oil. The Buy/Sell program was also terminated. Refiners no longer receive a price advantage by using royalty oil and so the argument that small refiners would be hurt has become irrelevant.

One royalty oil option currently being discussed is for the Government to set aside the money it receives for the oil in order to purchase an equivalent amount on the world market. This, it has been argued, would ease the administrative burden of physically acquiring or exchanging oil from so many separate leases. We do not believe that this is the best approach.

First, and most importantly, DOE would still be subjecting itself to the uncertainties of the international oil market. If the world oil market tightens, DOE may not be able to purchase any oil except at very high spot market prices. It might also come under intense international pressures to refrain from purchasing for its stockpile, and could therefore decide, as it did in 1979, to suspend purchases. On the other hand, if DOE were to take or exchange the royalty oil for the SPR, it would have a secure supply under tight market conditions. At the same time, this kind of arrangement would reduce the Federal Government profile in the oil market as a buyer and seller. Perhaps most importantly, it would demonstrate that the U.S. Government places a high priority on filling the SPR, and does not treat SPR oil acquisition as marginal. Second, this option does not actually save the Government any money. While DOE's budget for the SPR may appear to be reduced, those activities and programs now receiving the royalty funds would presumably require an equivalent amount of additional funding.

Mandatory allocations to the SPR

DOE's Office of General Counsel has argued that DOE may, through the EPAA, allocate oil to the SPR from the national oil market, although it recognizes that this action is subject to legal challenge. Title VIII of the Energy Security Act requires DOE to fill the SPR at a minimum rate of 100 MBD. In order to meet this requirement, DOE's ERA developed regulations to require certain refiners to provide oil for the SPR if its competitive exchange program had not reached this level. 1/

1/For more information, see U.S. General Accounting Office, "Status of Strategic Petroleum Reserve Activities--February 1981," EMD-81-49, Feb. 24, 1981.

According to ERA officials, the mandatory approach could also be used to exceed the 100 MBD requirement. ERA finalized the mandatory regulations on January 5, 1981, to be effective on February 13, 1981 (later postponed to March 30). However, on January 28, 1981, the President issued Executive Order 12287 which removed remaining price and allocation controls on crude oil and refined petroleum products. The mandatory regulations are part of the allocation controls. On April 3, 1981, DOE withdrew the applicable rules, saying that because crude oil was no longer regulated, the rules would have no effect. Therefore, DOE currently cannot allocate oil to the SPR.

ERA officials have, in the past, said their preferred approach for obtaining oil is through a voluntary sale or exchange but the agency would use the mandatory approach, if necessary, to obtain additional oil for the SPR. Other DOE officials have also said more recently that the new administration prefers a voluntary program if at all possible. Industry representatives have testified before DOE against a mandatory program, citing possible inequities among companies, administrative burdens, and transportation problems.

On the other hand, a mandatory program has the advantage of maintaining a low U.S. profile on the world market and minimizing the disruption of commercial relationships between major U.S. crude oil purchasers and domestic and foreign suppliers. It does not distinguish between domestic and foreign oil and lets industry make decisions on how best to obtain the oil.

The authority on which a mandatory program is based, the EPAA, is due to expire September 30, 1981. While we agree that the most desirable approach for filling the SPR is through voluntary measures, we also believe that DOE needs to maintain this mandatory authority to acquire oil in case other options fail. The very existence of mandatory authority may also encourage industry cooperation on other ways to fill the SPR. Furthermore, we believe that filling the SPR should have a very high priority. It should not be totally reliant on the uncertainties of the international oil market. Except under severe supply disruptions, the SPR should continue to be filled. Without maintaining a standby authority to require mandatory allocations, DOE cannot assure itself that the SPR can continue to be filled under various market conditions.

Competitive purchases

DOE could buy oil for the SPR competitively on the spot market or through longer-term contracts. Through 1980 most SPR crude was obtained under six-month contracts. A small amount was obtained on the spot market.

On January 30, 1981, DOE began open continuous spot market solicitation for additional oil. The solicitation invites companies to submit offers to sell oil to the SPR weekly. According to officials from the Defense Fuel Supply Center, DOE's purchasing agent, these short-term, spot market solicitations are used to

contract for oil purchases totaling 10 MMB or less. A range of market prices paid for similar oils is used to evaluate the reasonableness of the prices offered for oil each week and to make final awards. Through August 19, 1981, contracts totalling 66.8 MMB of oil were awarded.

In general, DOE considers competitive procurement the preferred method for filling the SPR, and believes that if supplies can be obtained, this method should result in the lowest cost if the market is in balance. However, we believe purchasing oil on the spot market, as the only method of competitive procurement, is inadequate. Under tight market conditions, when spot prices are normally higher than contract prices, probably the best that could be expected is offers at high prices. This is in fact what happened earlier. In early 1979, after two solicitations met with only partial bids (and even those DOE considered to be unreasonably high), DOE suspended purchases. The acquisition strategy it had pursued did not, in effect, allow for continuing purchases in a tight market. It was 1 1/2 years before DOE again resumed filling the SPR.

DOE has already taken two steps which should provide more supply security than spot purchases for fiscal year 1982 and beyond. 1/ On August 7, 1981, DOE's purchasing agent issued a solicitation to acquire up to 36.5 MMB of sour crude oil to be delivered to the SPR during fiscal year 1982. If contracts are awarded for the full amount, it would be equivalent to an average fill rate of about 100 MBD for the new fiscal year. Also, on August 20, DOE signed a multi-year contract with Petroleos Mejicanos (PEMEX), Mexico's State oil company, to acquire up to 110 MMB of oil for the SPR. DOE officials estimate that, depending on delivery arrangements now being made, about 6 MMB will be delivered during September 1981. According to the contract, an additional 31.7 MMB of oil will be delivered during fiscal year 1982. The remaining 72 MMB will be delivered between October 1, 1982, and August 31, 1986, at a rate of about 50 MBD. However, the Mexican contract provides either party ample opportunity to suspend it. During September 1981, DOE will pay $31.80 and $28.50 per barrel delivered (exclusive of transportation costs) depending on the oil quality. Beginning October 1, 1981, prices of crude oils may be adjusted every quarter by mutual agreement. IF DOE and PEMEX fail to agree on prices within 10 days after the beginning of each quarter, PEMEX may suspend deliveries for that quarter. The contract can be terminated by either PEMEX or DOE if deliveries are suspended for any quarter and a price agreement cannot be reached for the subsequent quarter.

While the August solicitation, if successful, and Mexican contract will probably provide greater supply security than spot purchases, they still leave SPR fill subject to the vagaries of

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1/For more information, see U.S. General Accounting Office, "Status of Strategic Petroleum Reserve Activities--August 1981, EMD-81-136, August 28, 1981.

the international oil market. Because the world oil market is likely to be tight and subject to numerous kinds of disruptions, DOE should adopt an acquisition strategy which does not break down when the oil market tightens. It should establish a program which, for the most part, does not rely on short-term procurements and which allows continuing purchases under tight market conditions.

Fill rate

In December 1979 DOE's Office of Oil Policy distributed a draft analysis of acquisition and drawdown strategies for the SPR. The conclusion was that an active SPR program, in which the reserve is built up steadily at a rate of 550 MBD, would maximize the value of the SPR under a broad range of assumptions about the likelihood and severity of future disruptions. The Secretary of Energy endorsed this strategy in his draft Policy, Programming, and Fiscal guidance statement for fiscal years 1982-1986.

However, current technical and political factors may constrain the rate of SPR fill to below this 550 MBD. Phase I storage capacity is only about 251 MMB, and is expected to remain about that level until mid-1982. Capacity is then projected to grow steadily to 538 MMB by 1986. If even a 300 MBD fill rate had begun on, say June 1, 1981, DOE would not have sufficient storage capacity after July 1982. Based on a November 1980 schedule for Phase II expansion, DOE officials project, however, that they will have sufficient new storage capacity to maintain a 215 MBD fill rate, starting in June 1981, through the third quarter of fiscal year 1984. 1/

Another factor limiting rapid SPR fill is the U.S. pledge, along with that of six other major oil importing countries, in Tokyo in June 1979 to refrain from purchasing oil for strategic stockpiles when this would place "undue" pressure on world oil markets. A 550 MBD fill rate might create "undue" market pressures. Also, some producer countries, notably Saudi Arabia, have expressed displeasure at an active U.S. SPR program.

Through August 20, 1981, fiscal year purchases were made at an average of 300 MBD, a vast improvement over earlier years. (Actual monthly receiving rates fluctuated between over 100 MBD and 513 MBD.) We believe the SPR should be filled as fast as practicable. DOE's fiscal year 1981 appropriations legislation clearly demonstrates Congressional intent. It provides for DOE to seek to fill the SPR at an average rate of about 300 MBD, or until all funds are used. The Omnibus Budget Reconciliation Act of 1981 provides for a 1982 average fill rate of 300 MBD. If that rate could be sustained, the SPR would contain 750 MMB by late 1986, according to figures from the National Petroleum Council.

1/See U.S. General Accounting Office, "Status of Strategic Petroleum Reserve Activities--February 1981," EMD-81-49, Feb. 20, 1981.

If, however, DOE were to maintain a fill rate of 300 MBD beyond 1982, it will need to decide soon on how to increase or accelerate available storage capacity. In February 1981 we recommended that the Secretary of Energy (1) insure that adequate storage capacity is available on a timely basis to meet the needs of an accelerated SPR fill effort, and (2) report to the Congress on the costs, advantages, and disadvantages of an accelerated construction program and other storage options. DOE's Deputy Assistant Secretary for the SPR told us that DOE is aware of its inability to maintain a 300 MBD fill rate beyond July 1982, and has examined options for increasing SPR storage capacity. According to the official, as part of its fiscal year 1983 to 1988 Program Planning and Budgeting System, DOE is examining such options as accelerating the current Phase II construction schedule, acquiring additional SPR sites, and purchasing or leasing tankers for temporary SPR storage. However, DOE has not reached a final decision on these alternatives. The Reconciliation Act's Conferees expect the administration to consider the advantages of leasing facilities on a short-term or long-term basis to permit a rapid increase in capacity.

Because developing storage facilities and acquiring oil is so expensive, numerous proposals have been discussed to provide alternate means of financing the SPR. Some of these include capitalizing the SPR by allowing the public to buy title to a specified quantity of oil, issuing bonds, or creating some kind of industry-financed reserve. For fiscal year 1982, the Omnibus Reconcilation Act of 1981 funds the SPR by creating a $3.9 billion off-budget account within the U.S. Treasury for oil acquisition and transport, and drawdown if necessary. An additional $260 million is provided on the budget for other expenses such as cost of operations and maintenance, construction, and administration. Any funds for after 1982 still require authorization and appropriation.

While the merits of the various financing options are beyond the scope of this report, we strongly believe the SPR fill should not be interrupted while long-term alternative financial arrangements are sought. The damages of suspending purchases were described earlier.

Conclusions

The SPR is vital to reducing U.S. vulnerability to petroleum disruptions. An active SPR program can provide credible evidence that the United States has the will to insulate its economy from major supply disruptions and reduce the economic impacts if one does occur. It can help avoid undue pressures on either domestic or foreign policy, and contribute to international stability through the IEA. However, six years after its establishment, the U.S. SPR will not materially help in coping with an extended major oil supply interruption.

We believe that DOE in the past accorded too low a priority on filling the SPR. It has treated the SPR as the marginal user

of oil; when the market tightened, purchases were suspended. No oil was purchased for the SPR between November 1978 and September 1980--almost 2 years--until the Energy Security Act finally mandated a nominal fill rate of 100 mbd. DOE has cited the Tokyo agreement as a reason for failing to purchase oil when the world oil market was tight. It has also acknowledged the oppposition of major oil-exporting countries to filling the SPR, although it claims this is not a major reason.

Although the current SPR fill rate has improved over earlier years, the oil acquisition strategy is inadequate. Exchanges for oil have provided only 100 MBD. Spot market solicitations leave SPR fill subject to the uncertainties of the international oil market. A recent long-term solicitation and contract with Mexico's state oil company will probably provide more supply security than spot market solicitations. However, they still leave SPR fill subject to the vagaries of the international oil market. DOE could continue to negotiate with the State of Alaska for some of its North Slope royalty oil (40-140 MBD), obtain royalty oil from onshore and/or offshore crude oil production on Federal lands (up to 174 MBD), or require certain refiners to provide oil. Each of these options would provide a relatively secure source of oil and reduce the U.S. profile as an oil buyer in the international market. We believe Congress should maintain DOE's authority, which expires after September 30, 1981, to require refiners to provide oil for the SPR, as a backup in case other acquisition strategies fail.

We recognize that the United States must balance the need for a large reserve against the desirability of minimizing disruptions on the world oil market. However, there are not likely to be better opportunities to fill the SPR--the world oil market is likely to be tight in the future and subject to a variety of disturbances. Filling the SPR should be considered a part of U.S. base demand and, at least until the SPR has reached a minimum threshold size, DOE should not suspend purchases under tight market conditions. Fill should not be interrupted while long-term financing is sought. Given the high priority of the SPR, we believe the new administration should comply with the congressional intent and agressively pursue acquiring additional oil for the SPR.

CHAPTER X

SUBSTITUTION OPTIONS

Coal, natural gas, and electricity could play a more prominent role in substituting for oil during an oil supply disruption. However, maximizing their use will require action to remove numerous constraints. Considerable resources from both industry and government will be needed to develop a more meaningful capability in these areas.

Increasing the potential for substituting gas for oil during emergencies will entail establishing additional fuel switching capability and resolving gas transportation bottlenecks. Also, a plan for securing gas supplies will be needed. Environmental impediments stand in the way of an effective coal switching program. Achieving greater savings through electricity transfers will require expansion and/or improvements in the transmission system, an expensive and time-consuming project.

This chapter discusses several options for dealing with some of these constraints: encouraging the use of a mixture of natural gas and coal in powerplants to facilitate switching to coal; establishing a strategic natural gas reserve; exploring the possibility of negotiating agreements in advance with Canada and Mexico to secure additional natural gas imports and expanding transmission capacity to achieve greater electricity transfer potential.

All of these options aim at developing a standby substitution capability. A few relate to short term measures, but most have long implementation lead times. Further, because available information on fuel switching is inadequate, it is unclear if the options discussed in this area can be pursued without further study. Until the government acquires better data, the role of fuel substitution during an oil supply disruption will remain uncertain.

MIXING GAS AND COAL IN EXISTING ELECTRIC FACILITIES

DOE has identified 19 powerplants which could burn coal but are unable to do so because existing environmental statutues and regulations do not permit it. 1/ If coal switching were allowed at these plants during an oil supply disruption, about 143 MBD would be saved within 12 months, according to DOE. However, as indicated in Chapter IV, modifiying existing laws or seeking all the appropriate environmental waivers is a formidable task.

An option that could help address the environmental constraint and accelerate coal switching during an emergency is to encourage

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1/There are coal conversion plans for some of these powerplants but in general this is a medium to long term activity.

the use of a gas and coal mixture in the 19 powerplants. Because natural gas burns with no sulfur dioxide and virtually no particulate emissions, it can be combined with coal to facilitate switching in a manner more consistent with environmental standards. Additionally, a mixture of gas and coal could help reduce the cost of switching during an emergency by eliminating the need for large capital expenditures on pollution control equipment.

Both EPA and DOE have estimates on the coal to gas ratio required to maintain the sulfur dioxide emissions at the level previously emitted by oil combustion. The ranges are between 62 to 77 percent coal and 38 to 23 percent gas.

There are several ways to use gas selectively with coal. Gas could be burned either in the same coal-fired unit or in a separate boiler in the same facility; throughout the year in part of the facility (e.g., one boiler) or part of the year in the whole facility. Obviously, for contingency planning purposes it would be better to establish the capability throughout the year. Some of the powerplants that DOE identified are now using oil and are capable of burning coal could use gas with minor modifications provided that they are near gas distribution lines. The use of a gas and coal mixture is not an unusual practice. Several electric companies are presently combining small amounts of gas with coal in some of their units. But the FUA restrictions on gas use limits its application for normal operation.

While sulfur dioxide emissions would remain unchanged, with the appropriate mixture of oil and gas other environmental aspects of increased coal use are likely to present problems to effective implementation of this option. For example, ash deposits, noise, and coal transportation disrupt the environment. Utilities would have to obtain permits in each area from Federal and State regulatory bodies. Permitting would take a minimum of six months. Consequently, the gas and coal mixture option might not be effective for contingency purposes unless the relevant environmental requirements are streamlined and utilities can proceed quickly to use coal.

For emergency purposes there seem to be no legal impediments to the use of a gas and coal mixture in utilities. There are several provisions in the Powerplant and Industrial Fuel Use Act of 1978 which could be used to accomplish this: permanent exemptions for emergency purposes; permanent exemptions for certain fuel mixtures containing gas, coal, or petroleum; temporary public interest exemptions and temporary exemptions due to the site limitations or environmental requirements. The temporary exemptions generally can be issued for a maximum of 5 years but extensions may be possible in some cases.

ESTABLISHING A STRATEGIC NATURAL GAS RESERVE

The establishment of a Natural Gas Reserve as part of a standby natural gas conversion strategy is one way of increasing and assuring supply flexibility to deal with an oil supply

disruption. While there is currently a surplus of natural gas, supplies may not be readily available under all emergency circumstances. In particular, there might be parts of the country like California where gas supplies could be a problem. A natural gas reserve would ensure that end users who have gas switching capability will not be supply-constrained. It may also encourage industry to acquire capability to switch to gas. The need for developing a strategic gas reserve, whether at the national or regional level, will depend on the efforts made to achieve a standby gas switching capability as well as on the gas supply/demand outlook. A commitment to foster gas use during an emergency may in some cases require mandatory measures and programs to address capital investment requirements.

Establishing a natural gas reserve would involve four steps. First, a plan for securing gas supplies must be formulated. The natural gas could come from increasing production of existing wells (i.e., pumping at a higher rate or capping domestic wells for surge capacity); from conventional storage capacity, setting aside volumes for emergency use (i.e., gas built up in existing storage to the extent feasible during the summer); and/or from increasing Canadian gas imports (by contracting in advance on a standby basis or buying gas now and storing it). An assessment of potential supply sources must be made. Incentives could be designed for private companies to develop wells and maintain production at levels below the maximum efficiency rate, thus establishing a surge capability for emergency use only. The plan should address location, the size of the reserve and cost issues.

Second, the capability to deliver surge gas supplies during an oil disruption must be developed. Third, the necessary funds for this kind of effort must be secured. Considerable capital outlays will likely be required to develop existing fields for greater gas production, establish additional storage capacity if needed, install gas lines and supplement the distribution network. In addition, funds will be needed to design and manage the reserve. Fourth, a detailed program to address how the reserve will be used during an emergency will be required. The program must address drawdown rate, allocation and pricing issues.

The effectiveness of a gas switching strategy also depends on the extent to which the displaced residual fuel could be used to satisfy the demand for lighter oil products usually in short supply during a disruption. As noted in Chapter IV, the principal candidates for switching are electric powerplants and major fuel burning installations which consume mostly residual oil. According to DOE, preliminary analysis conducted by several groups suggests that industry has the capability to upgrade residual oil.

EXPLORING THE POSSIBILITY OF NEGOTIATING AGREEMENTS IN ADVANCE TO SECURE ADDITIONAL NATURAL GAS IMPORTS FROM CANADA AND MEXICO

Contracting for excess Canadian gas is one near-term option for meeting United States gas requirements during an emergency. AGA estimates indicate that about 500 MBD fuel oil equivalent could be available from spare capacity in Alberta gas fields alone.

There are several ways in which the United States could attempt to negotiate for increased imports. One way would be to contract in advance for a specified amount of gas imports to be delivered during an oil supply disruption. By doing this, we would be essentially using Canada's surge capacity as an emergency reserve. This may be the cheapest way to obtain additional gas in the immediate term, except for withdrawals from domestic gas storage, because it avoids investment in additional storage capacity or development of domestic fields. However, it may be risky to rely on this type of arrangement for dealing with an energy crisis. A contract may not inhibit Canada or any other exporter nation from cutting exports if the country is also adversely affected by an oil shortage. Alternatively, the U.S. Government could try to negotiate an increase in current authorized Canadian natural gas import levels, and use increased imports to create a gas reserve in the United States. The additional gas could be stored in depleted gas wells or in a facility specifically built for this purpose.

In any case, but especially the former, this course of action would depend on Canada's willingness to enter into this type of an agreement in the face of the uncertainties associated with oil market disruptions.

Negotiations with Mexico could also be considered. However, this would be a more long-term proposal given the constraints on the pipeline network for the delivery of additional gas. There are a number of practical issues that should be addressed in examining the possibility of contracting for increased gas import levels. Among these are:

--How much and how effectively could the U.S. system deliver additional gas in an emergency?

--How much additional gas should be imported?

--How much should the United States pay for gas imports during emergencies?

--Where would the additional gas be stored and what kind of financial mechanism will be created to fund the storage?

Also, before planning to secure additional supplies, a commitment to use oil-to-gas switching as a strategy for dealing with oil shortages will have to be made.

EXPANDING TRANSMISSION CAPACITY TO INCREASE THE ELECTRICITY TRANSFER POTENTIAL

Opportunities for obtaining significant savings from electricity transfers are constrained primarily by the capacity of the transmission system. Electric utilities are currently achieving about 90 percent of the maximum oil conservation transfer potential. According to DOE there is an upper limit of about 130 MBD of additional oil displacement that can be realized depending on the

circumstances present at the time of the transfers (e.g., time of day, transmission losses).

Achieving greater savings will require expansion and/or improvements in the transmission system, an undertaking that is not only time-consuming but expensive. Given the complex nature of the electric generation and transmission systems, this would naturally involve substantial planning.

Increasing the transmission capacity in a given area could take 3 to 7 years depending on the type of project. Delays in obtaining licenses, regulatory approval or getting right of way for construction could affect timing.

Planning for additions or improvements in transmission capacity as a means of increasing the electricity transfer oil savings potential will require that the following activities be performed at a minimum:

--identifying specific areas/regions where transmission lines, additions, or modifications are needed and the particular type of improvement required,

--calculating the fuel savings potential that could be achieved through electric transfers from non-oil generating facilities to oil generating units if the constraint on transmission capacity is removed,

--estimating the cost of undertaking projects to expand transmission lines, and

--providing means to finance the costs if warranted.

These activities would have to be performed on a case-by-case basis. Expanding transmission capacity generally implies that there is increased ability for transferring energy from one region to another but this may not be true in all cases. Additional transmission lines within a specific region, for example, may be needed to meet demand, relieve overloads on existing lines, or improve system stability rather than solely to save oil. This distinction is important when considering how to finance capacity expansion. Utilities may not be willing to make an investment in expanded transmission capacity for the sole purpose of displacing oil during an oil crisis.

The government must determine if additional transmission capacity is warranted and whether a financial program would be needed to expand transmission capacity for emergency purposes.

CHAPTER XI

OPTIONS FOR IMPROVING DEMAND RESTRAINT

Demand restraint is not a new issue. In spite of the fact that it has been used to combat shortages, of water for example, a great deal of confusion surrounds it when the Federal Government applies it to oil. Since the early 1970's law has required that comprehensive emergency energy demand restraint programs be prepared and ready for use. Since 1979, Federal law has required that the 50 States and 7 other U.S. jurisdictions be prepared to play a key role in demand restraint by establishing standby programs to use in the event of disruption. Nonetheless, the United States still has virtually no emergency demand restraint programs in standby status. One measure--emergency building temperature restrictions--could be implemented nationwide under EPCA. Under EECA, minimum fuel purchase could be implemented nationwide and public information regarding gasoline use could conceivably be invoked under the Federal Standby Plan, but only on a State-by-State basis and only after each State had been given many months to prepare and implement programs of its own. Odd/even fuel purchase will be available until EPAA expires, and increased speed limit enforcement is a possibility although no programs have actually been planned to carry it out. Together, these measures might save 200-350 MBD, if efforts were coordinated and information was consistent, which they are not.

This deplorable lack of viable demand restraint plans and programs could have serious implications in a shortage. In addition to measures to increase oil supplies and substitute other energy supplies for oil, there are only a few alternatives: increased prices, allocation, and demand restraint. Higher prices are, to say the least, unpopular. They increase inflation and reduce the standard of living. Concerning allocation, the Nation's experience during the 1979 Iranian oil shortfall showed that poorly planned and administered allocation may be worse than no action at all.

Of the three alternatives, demand restraint involving action to cut back less essential consumption seems most desirable. Next to that, mandatory demand restraint measures may also be preferable, up to a point, to increased energy prices or allocation. At a minimum, it seems that demand restraint should be given a fair chance to work. If its savings are insufficient, greater reliance can be placed on higher prices and allocation.

Immediate development of a standby demand restraint plan using available measures and systematic evaluation of possible additional measures for such a plan are essential. The legislative mandate is clear: "an urgent need exists to provide for emergency conservation and other measures with respect to gasoline, diesel fuel, home heating oil, and other energy sources in potentially

short supply in order to cope with market disruptions and protect interstate commerce." 1/

CRITERIA FOR EVALUATING MEASURES

Federal demand restraint measures should meet certain criteria which indicate that they provide benefits that outweigh their disadvantages. A demand restraint measure's first test is the amount it reduces fuel consumption. It should also promote orderly reduction of energy use with a minimum of inequity, uncertainty, and disruption of normal activity. Any measure that adds to the chaos and confusion created by a disruption would not be suitable, even if it had great fuel saving potential. In fact, actions that promote order and reduce panic during an emergency have value even if they do not save an appreciable amount of fuel.

Any measure that can meet these two basic criteria--producing significant savings and promoting order--should then be scrutinized in terms of other factors. Is the action authorized by present law? Would it involve exorbitant costs? Could it provide results in a timely manner? If mandatory, could it be enforced? If voluntary, could people be persuaded to use it? Each measure must be examined from these additional perspectives before it is included in a Federal contingency plan. During a supply disruption, imposition of a faulty program could cause more problems than no program at all.

We believe that voluntary measures are usually preferable to mandatory ones and that voluntarism should be emphasized in the initial phase of a disruption. Even mandatory programs depend heavily on consumer cooperation for their effectiveness, because means of enforcing compliance may not be readily available. However, they do not leave it up to end users how and to what extent to reduce consumption. Such programs should be included in a comprehensive contingency plan, but depending upon the effectiveness of voluntary programs, implementation of severe mandatory measures may not be needed.

The principal problem with voluntary cooperation is that when the crunch strikes, the public's response may not match the need. This point certainly needs to be taken into account in sound contingency planning. Since it is a distinct possibility, it means that mandatory backup programs should be ready to implement. Nonetheless, the potential inherent in voluntary demand restraint programs should not be overlooked. In past emergencies, and not just energy emergencies, Americans have frequently shown themselves ready to rise to the occasion provided that the need to make voluntary sacrifices was clear. For example, communities which have experienced serious droughts have had successful voluntary reductions in water use. If voluntary programs fail, then mandatory programs can be used and the need for them is clearer to everyone.

1/P.L. 96-102, Sec. 201

Voluntary demand restraint leaves people free to decide where and how to best reduce their own consumption. Well-informed individuals can judge better than bureaucrats how to reduce consumption so as to minimize any adverse impacts on their lifestyles and interests. If the Federal Government must resort to mandatory programs that apply broad restrictions on particular activities (i.e., what days you can gas up or drive your car, how high or low to set thermostats, etc.) or that try to make all end users restrict use to a given amount (i.e., gasoline rationing), a great deal of individual flexibility would be lost.

Mandatory measures, on the other hand, provide enforced equity and a sense of "sharing the burden" equally. In severe disruptions, even those mandatory measures that have anticipated adverse economic and/or social effects may be justified if they prevent more hardship than they cause. When the approach is mandatory, Government accepts the responsibility for weighing the relevant factors and deciding how best to curtail demand. Individual decisionmaking is overridden. It is therefore of the utmost importance that these measures be adequately evaluated in advance, before they are included in a standby plan.

EXAMINATION OF OPTIONAL DEMAND RESTRAINT MEASURES

In order to make the process and substance of demand restraint planning clearer, we evaluated a number of proposals. This exercise was not meant to develop an operational demand restraint plan; its purpose was to apply the criteria and so suggest promising areas for planning. Needless to say, other proposals will probably be developed if and when thorough demand restraint planning begins at the Department of Energy.

Hundreds of suggestions of ways to reduce demand for petroleum products in an emergency have come from both inside and outside the Federal Government. Analysis of these proposals shows that most of them are unsuitable for use in Federal contingency planning. However, a small number could be valuable if sufficient attention were paid to their careful development and judicious use in a disruption.

We reviewed a total of 380 suggestions from more than 20 sources. Of the 380, 59 were judged so extreme as to justify no further consideration. These included such suggestions as: eliminating indoor lighting at night, banning shaving, and closing schools and teaching via TV. Another 186 measures were eliminated because they were long-range conservation steps that could not be brought online quickly enough to be useful in an emergency. These measures included the use of small-scale wind electric machines to provide residential energy, promoting underground residential construction, and establishing mandatory thermal efficiency standards for new buildings. From the original list of 380 measures, 135 were evaluated using our criteria.

These 135 ideas were first subjected to the tests of significant and orderly savings. It should be noted that there is often an inverse relationship between savings and disruption of normal activities. Measures that can save large amounts of fuel are often disruptive, thus defeating one main purpose of contingency planning. An example of this would be shutting down "non-essential" industries. These policies, if mandated nationwide, could cause greater economic losses than a severe oil disruption. Of the 135, only 10 passed the significant savings test and of these 2 seemed to be too highly disruptive. The remaining 8 measures were:

1. Reduced gasoline and diesel fuel purchases;

2. Reduced jet fuel use;

3. Energy cutbacks by leading ten industrial users of energy;

4. Reductions in electricity, oil and gas use by residences, commercial and industrial enterprises generally;

5. Speed limit reductions;

6. Restricting vehicle use;

7. Closing gas stations on weekends; and

8. Compressed work and school weeks.

Each of these approaches has advantages and disadvantages. However, we believe that some of them, particularly the first four, might--if properly conceived and executed--yield significant oil savings at tolerable costs. They could initially be voluntary and would, if necessary, be followed by mandatory implementation. The latter four measures could be more disruptive. Since they entail major changes in lifestyle and/or considerable inequities, they would be reserved for later use in especially severe disruptions. Energy consumers would be urged to cooperate fully in implementing the less disruptive voluntary approaches, and warned that otherwise tougher measures might become necessary.

To be successful, we believe that it would be essential to ready plans prior to a disruption but to only activate them as necessary when the probable size of the disruption can be reliably estimated. Equally important, we believe, is that the measures should initially be employed on a voluntary basis. As discussed earlier, mandatory restraints may entail considerable hardship and suffering for some people and must be carefully evaluated in advance. If the demand restraint is voluntary, it can be applied almost immediately. Mandatory programs may require at least several weeks lead time to put in place and deal with exemptions, whereas voluntary ones leave these choices up to the individuals.

Finally, we believe that the American people should be given an opportunity to voluntarily adjust their lifestyles to restrain demand. Americans have done so in the past. The key to such a response, of course, is a perception that the effort is really necessary. This leads to a third essential ingredient--strong public information programs. These are necessary to convince people that demand restraint is necessary and to tell people how they can effectively reduce demand to achieve local, state, and national demand restraint goals.

We believe voluntary programs can work provided that (1) they are begun quickly with strong public information presentations, (2) that emergency data collection systems determine--with minimal time lags--how much demand for key products is being reduced, and (3) that steps are simultaneously taken to prepare for the use of mandatory measures if necessary. On this basis, a largely voluntary approach can be given a chance to work since the United States would have an appreciable lead time before any shortfall reaches the Nation's shores. This is because at a disruption's onset, oil tankers at sea will be carrying many weeks of normal supplies of oil imports for U.S. consumption.

The 8 proposals which we discuss are certainly not the only ones which could find a useful place in a comprehensive demand restraint plan. They are, however, worth analyzing further to illustrate their strengths and weaknesses and suggest areas which warrant further development.

Reduced gasoline and diesel fuel purchases

Measures to reduce gasoline consumption are a key to successful demand restraint. Gasoline accounts for nearly two-fifths of the Nation's overall oil consumption. Equally important, there is some evidence of significant potential for reducing gas use with minimal adverse effects. Some surveys done during the last several years indicate that the average U.S. household could reduce its driving up to 15-20 percent without great sacrifice. In terms of 1980 gasoline consumption (6.6 MMBD), a 15 percent reduction would equal about 1 MMBD--a very substantial amount.

Gasoline purchases can be reduced in many ways. Motorists could be asked to voluntarily reduce their driving by about 10 percent--leaving it completely up to each driver how to cut back. In an alternate version, motorists could be asked to limit their gasoline purchases to once a week--Monday through Friday with open sales on weekends, or Monday through Sunday and no open sales on weekends.

If these measures failed to achieve needed savings, a mandatory program such as odd/even could be adopted. Again, alternate versions are possible. Using license plate numbers, cars with plates ending in 0 or 1 could fill up on Monday, 2 or 3 on Tuesday, through 8 or 9 on Friday. Weekends could have open sales. Or, the rotation could start over on Saturday. If it did, in any given

week 60 percent of all motorists would be limited to one tank of gas per week, while 40 percent could fill up twice. If gas stations were closed on Sundays, the percentages, respectively, would be 80 and 20.

A more complex system for administering a mandatory approach could involve using computer punch cards when motorists bought gasoline. Motorists would be required to sign a card when they bought gasoline and cards would subsequently be crosschecked by computer. Anyone buying more than their limit could be substantially fined.

Any reduced gasoline purchase plan should cover the purchase of diesel fuel for cars as well. While the number of diesel-fueled cars on the road is small compared to gasoline, equity requires that diesel car owners be subject to the same rules. In addition, since diesel fuel for cars is comparable to home heating oil, reduced use of diesel for transportation would ease the shortage difficulties of people who use oil to heat their homes and businesses.

A voluntary approach to reduced gasoline and diesel purchases seems clearly preferable to a mandatory one. The "average" motorist may be capable of cutting back his driving by as much as 15-20 percent without great personal sacrifice, but many motorists are not average. Motorists who require more than one tank of gas per week would be inconvenienced by this measure, some of them probably quite seriously. If implemented on a mandatory basis, arrangements would have to be made ahead of time to deal adequately with those people who use their cars for essential travel or business. About 30 percent of the car owners in the United States have no alternative transit available. Emergency services such as ambulance, police, and fire departments would also have to be provided for. A computerized mandatory system would be cumbersome and prone to error and breakdown. The number of necessary exemptions could strain the system. Without exemptions even the threat of a large fine would not be enough to assure compliance with a measure that forced intense hardship on certain people. These problems would have to be resolved in advance or mandatory gasoline purchase curtailment might cause more adverse effects than its expected savings would warrant. As a last resort, however, in a severe emergency, even mandatory reductions of gasoline and diesel fuel purchases might alleviate more hardship than they would cause. The severity of each measure must be evaluated in view of the circumstances under which it might be used.

Reduced jet fuel use

Jet fuel consumed by civilian and military aircraft accounts for about 6 percent of all petroleum products consumed in the United States, or about 1 MMBD. A reduction in jet fuel use more or less proportionate to the Nation's loss of oil could help in a small yet significant way to offset a disruption. For example, in a 10-15 percent oil shortfall to the Nation, a proportionate reduction in jet fuel use would be 100-150 MBD.

Concerning civilian use of jet fuel, a voluntary approach could work in the following way. The Secretary of Energy and the Secretary of Transportation could request the airlines to prepare plans for responding to various sizes of oil supply shortfalls by voluntarily reducing their consumption of jet fuel. The airlines would be asked to identify to what extent rearranged schedules and increased load factors could offset shortfalls with a minimum amount of disruption and inconvenience to air travelers, and to have plans ready for use. Such plans could include provisions for advertising to inform air travelers of changes and to encourage them to cooperate voluntarily in adjusting their air travel needs to the emergency conditions.

Since certificated airlines account for over 90 percent of jet fuel consumption in the civilian sector, it should be relatively easy to monitor the effects of this measure. If the airlines failed to meet their targets, a mandatory program could be instituted as necessary, or, as a last resort, allocation programs could be used to alter refinery yields and reduce jet fuel output to the desired levels.

Energy cutbacks by leading industrial users of energy

This measure would be voluntary, but sponsored and coordinated by DOE. EPCA mandated the creation of a program to improve the efficiency of energy utilization by U.S. industry, which involved the top ten industries meeting voluntary energy goals. The ten most "energy consumptive" industries were identified as: (1) primary metals; (2) chemicals; (3) petroleum and coal; (4) stone, clay, and glass; (5) paper; (6) food; (7) textiles; (8) fabricated metals; (9) non-electrical machinery; and (10) transportation equipment. They improved efficiency from 9 percent for primary metals to 24 percent for fabricated metals between 1972 and 1979. The average improvement was 15 percent over the seven year period.

These figures represent long range changes to adapt to a generally tighter energy situation. They do not necessarily indicate that significant savings could be realized by a short-term emergency effort.

However, industry is a big user of petroleum and although no estimates are available of what voluntary reduction could save in an emergency, even small savings by each company would be significant. In 1980, the industrial sector as a whole consumed nearly 4.5 MMBD of oil products. Coordination with industry in demand restraint planning might yield significant savings if a disruption occurred. Large energy consumers will be concerned about maintaining operations during a shortage and may have ideas and plans to help them through an emergency. The Federal Government, by cooperating with these industries, may be able to develop a demand restraint program with impressive results.

DOE could schedule a series of sessions with representatives from the various industries to discuss prospects for achieving

emergency consumption reductions. One purpose would be to encourage the different industries to estimate realistic demand restraint potential. Industries could be asked to develop analyses of the effects of reduced energy use on production output. DOE could work with industry associations as well, to promote the development of standby plans by their member companies. An additional benefit would be the established lines of communication in the event of an emergency.

Reductions in electricity, oil and gas use by residences, commercial, and industrial enterprises

This measure would promote fuel cutbacks in homes, businesses, and industrial enterprises that use electricity, oil or gas. As such, it would go beyond the previous suggestion which focuses only on the ten major industrial users of energy. Under this measure all customers would be asked to cut back their energy use by a fixed amount--such as 10 percent. Electric and gas utilities and fuel oil retailers would be involved in helping to implement this measure, which could involve voluntary and mandatory phases.

In its voluntary phase the program could, if desired, be initiatied in the early stages of an oil supply disruption. In its mandatory phase, it could serve as a backup, to be used if other demand restraint measures failed to achieve needed savings.

Such reductions have a number of drawbacks, particularly if made mandatory. For example, home owners who were already conserving energy would be penalized and those who were wasteful and careless would be rewarded. It could cause hardship to the elderly and poor who had already reduced their energy use to a minimum because of high costs. It would be inequitable as well for people who had enlarged their families or their homes. All of these factors would have to be considered in planning. In addition, it would be necessary to make allowances for changes in the weather that affect fuel consumption, both year-to-year and seasonal.

Concerning commercial and industrial enterprises, the measure would also penalize those who had already conserved energy and reward those who had been profligate. It would be inequitable for businesses which had been growing compared to those which had not. It would not take into consideration those businesses which produce more per unit of energy or which contribute more to overall economic growth and performance.

For these reasons, it seems preferable to begin using this measure voluntarily. A voluntary program could focus on asking people and businesses to make adjustments relative to their recent consumption habits, perhaps by sending suggested limits with their utility bills. For example, depending on the size of the shortfall, residential users could be asked to lower their thermostats in the heating season by a few degrees and the corresponding savings could be indicated. People who had previously set their thermostats at a low level--say 65 degrees--could be advised of other reductions that would help them to save, in such areas as

cooling or lighting. The sick and elderly would be advised to maintain settings that accord best with their health needs but also offered suggestions for cutting down in other ways.

Some innovative techniques could be used to promote restraint if plans were realized for standby use. For example, one New England power company has sought to promote non-emergency energy conservation by supplying analytical information with its monthly billings. Customers are told how their per day energy usage compares to the same period in the previous year and to what extent the weather was warmer or colder. According to surveys conducted by the utility, three-quarters of their customers read the information, and one quarter say their habits are affected.

In addition, this kind of tactic could be put to good use by electric and gas utilities and even by fuel oil retailers. If national or state leaders set specific goals for reducing energy usage, monthly billings could tell customers to what extent their energy consumption approached or exceeded the target, taking into account changing weather patterns.

If voluntary means were unsuccessful, a mandatory approach could be adopted. For example, utilities and fuel oil retailers could notify their customers that they could only consume 90 percent of the energy used during the corresponding month of the previous year--making appropriate allowances for changed weather conditions. Penalties in the form of stiff cost surcharges could be assessed for those that exceeded their limits.

Such a measure was tried by the Los Angeles electric utility during the 1973-74 Arab Oil Embargo. Both residential and industrial customers were required to reduce their electricity consumption by 10 percent and commercial customers by 20 percent. The results were impressive. One month after enactment of the ordinance, average residential electricity consumption was down by 23 percent, industrial by 16 percent and commercial by 28 percent. While actual savings across the country would probably be much less, this serves to indicate the savings potential if even a small cutback can be realized for electricity consumption alone.

The most oil savings from this measure would of course come from those people and businesses who directly use oil or who use electric power generated by oil-using utilities. Concerning the latter, electric utilities in New England, New York, Florida, and California burn about 80 percent of the oil used in producing electric power nationwide.

Some oil savings could be indirectly achieved as a result of demand restraint by people and businesses who use natural gas, or who rely on electric power that is largely derived from coal or nuclear power. The savings would occur to the extent that the reduced use permitted fuel switching. For example, during unseasonably warm winter periods, reduced gas demand might permit more natural gas use by industries and utilities that burn oil but have

a dual use capability for burning gas. Reduced demand for electricity might permit some increases in power wheeling to electric utilities that normally burn large amounts of oil. One study projects potential savings of 1.8 MMBD if maximum fuel switching is combined with reduced electricity consumption. This may be overly optimistic. Even so, there is potential for savings as well as some psychological benefits derived from asking all to reduce demand. Those people and businesses directly dependent on oil or on oil-powered electricity would not feel that they were bearing a disproportionate share of a shortfall.

A mandatory program in this area would be difficult and there are many problems that would have to be worked out in advance. If the drawbacks are anticipated and addressed, however, hardships associated with the measure could be minimized in the event that mandatory implementation was considered necessary in a severe disruption.

Speed limit reductions

According to studies prepared for DOE, automobiles and trucks are most fuel efficient in the 30 to 40 mph speed range. It generally is not feasible to increase speeds in urban areas where traffic speeds are below this range, but the large portion of the roadway system with speed limits in excess of 40 mph offers a potential for reducing fuel demand through a speed limit plan. According to the estimates of fuel efficiencies, further savings would be possible by reducing speed limits below 55 mph. Also, since compliance with existing speed limits is estimated at less than 50 percent, savings could be achieved with increased enforcement to secure higher compliance rates.

Several variations of these approaches have been examined--revolving around the size of the speed limit reduction, the degree of increased compliance, and the proportion of the Nation's roadway system that would be included. As an example of the savings that might be achieved by use of this measure, Argonne Laboratory estimated that 306 MBD could be saved by lowering the speed limit by 5 mph on all roads with current limits over 40 mph and by achieving a compliance rate of 70 percent.

There are several problems with lowering speed limits. Many motorists dislike the 55 mph limit, to say nothing about even lower limits. Truckers in particular would dislike any reduction since it would increase their costs. Lowering the speed limit by 5 mph is estimated to result in a percentage increase of 10-12% in travel and shipping time. It might be necessary to make some allowances for transportation firms although the nature of their business would cause them to suffer more greatly in a disruption than other firms.

While reduced speed limits would undoubtedly inconvenience many, the impact would be minor for most people. Because of this and since the measure offers promise of considerable savings, it deserves consideration. If a mandatory approach were adopted,

with heavy emphasis on a strong public information campaign to convince motorists of the need to reduce speeds and comply with existing limits, it could include a provision that the speed limit reductions be temporary emergency measures. Otherwise, some motorists might be inclined not to cooperate, feeling that the measure would be made permanent, as it was in the past.

Restricting vehicle use

Such restriction would require all cars in a household to be kept parked for 1 or 2 days per week. It would be mandatory from the start. As a fallback measure it would be used if once a week fuel purchases and speed limit reductions failed to achieve the necessary gasoline and diesel fuel savings. It could be imposed more quickly than rationing and would be less costly to the Government. It would save an estimated 260-715 MBD if compliance levels were at least 80 percent. It is estimated, however, that it would take 2 to 4 months to implement if all preimplementation steps had been taken, which they have not.

Vehicle use restrictions have serious drawbacks. If imposed for 2 days, they would effectively eliminate weekend travel for the 30 percent of car owners who must drive to work every day. Taxi use would go up as would rental car use. Since business would be exempted, business-owned vehicles would probably increase in both number and use. Even a 1 day plan would seriously strain public transit and enforcement of the measure would overburden police.

In DOE's proposal, stickers would identify which day or days a car could not be driven. By allowing car owners to choose the days, the plan would be more equitable but much more difficult to administer. If license plates were used to show which day or days a car could not be driven, then inequities to car owners would increase, although administration would be easier. Households with more than one vehicle would have an advantage unless all of their cars were parked on the same day or days. The more inconvenience a measure causes, the harder it is to achieve a high rate of compliance and the more time and resources must be spent on enforcement and dealing with a disgruntled public.

This measure has the potential to save a sizable amount of gasoline and although it has serious drawbacks, it appears to have sufficient merit to be considered further. It would be administratively simpler and less costly than rationing, even though it would be cumbersome. Detailed plans would have to be developed if stickers or some other variation of this measure were to be used in an emergency. Exemptions and hardship cases would have to be provided for in advance, and carpool matching programs would have to be designed to assist drivers without alternative transportation.

Vehicle use restrictions would certainly involve major changes in work habits and life styles for some people and it would take several months to put in place (even assuming complete pre-implementation). Its use should be reserved only for severe disruptions.

Closing gas stations
on weekends

This measure would prevent motorists from using more than one tank of gas between Friday and Monday by closing gas stations on weekends to restrict weekend travel. It would be highly disruptive and is specifically prohibited under EECA, but its potential to save gasoline in significant quantities may warrant further consideration.

The National Petroleum Council recently estimated that savings would average 240 MBD. However, the impact on recreational industries could be severe and this could also have a depressing effect on the economy as a whole. Closing stations would result in significantly longer queues at the pumps on both Fridays and Mondays. It would also inhibit emergency vehicles, taxis, and trucks, unless provision was made for them to obtain alternate gasoline supplies. Weekend station closing does not appear to have much value in helping to preserve order in an energy emergency unless the shortage were very severe. Its ability to save gasoline stems from the elimination of weekend travel. As prices increase in a shortage, nonessential travel would predictably decrease. A measure such as this might bring substantial negative impact without greatly enhancing the trend toward reducing travel already happening because of rising prices. However, if other measures do not obtain the necessary results, closing stations could be reserved for backup use. It is simple and quick to implement if exceptions are dealt with in advance and it is used for a short period.

Compressed work and
school weeks (four days)

Compressing work and school weeks into four days would save fuel by reducing the amount of transportation involved in getting people to and from work and school. Some savings might also result from having to heat and cool buildings fewer days. Savings from this measure are estimated at up to 400 MBD. Various assumptions are made about the number of companies involved and the percent of participation, which of course would affect the amount saved. Most estimates fall into the 200-300 MBD range, with participation of about half the work force.

The administrative problems accompanying a mandatory compressed workweek would be considerable. Organized labor is opposed to extending the 8-hour day and getting agreement in this area would be difficult. Some facilities, such as steel mills and hospitals, cannot shut down for a day. Exceptions would have to be identified ahead of time and provided for.

If a mid-week day were selected, fewer people might be tempted to take car trips or engage in other energy-intensive weekend activities. However, mid-week closing would disrupt production more than Friday or Monday. The advantages and disadvantages of alternate work schedules have been studied at some length, but Argonne National Laboratory concluded that further study of

same day versus staggered closing is needed. Without adequate advance preparation and cooperation of industries and unions, this measure could be chaotic and might cause a drop in productivity.

The estimated savings from using this measure are impressive, however, and although the measure would require major changes in the country's work habits and lifestyles, it might be preferable to the effects of a severe shortage if other measures fail. It should be reserved for possible use in lengthy disruptions because of the administrative efforts involved. Of course, any individual firms which voluntarily wanted to go to a four day work week as a means of helping to cope with a disruption would be encouraged to do so.

DEMAND RESTRAINT CAN WORK

Practical demand restraint programs are an essential part of effective contingency planning. Such programs have the potential to save significant amounts of fuel and can offset panic buying and hoarding which are so disastrous at the onset of a shortage. If carefully researched and judiciously applied, demand restraint programs can reduce hardship and help to unify the Nation's efforts to combat an emergency.

An important advantage of demand restraint programs is that in principle they can be targeted at virtually all major petroleum products (i.e., gasoline, jet fuel, distillate, and residual fuel oil) and all sectors of the economy (residential/commercial, industrial and transportation). Thus, even relatively small voluntary responses can yield important savings. For example, if motorists reduced their gasoline consumption by 10-15 percent, savings would approximate 650-1000 MBD. If airlines (including both civilian and military) could voluntarily find ways to cut back their jet fuel consumption by 10 to 15 percent, the savings would equal 100-150 MBD. If electric utilities in New England, New York State, Florida, California and Nevada, which account for 80 percent of the residual oil used for electricity could persuade their customers to voluntarily cut back by 10 percent, oil savings could exceed 120 MBD. If the industrial sector as a whole shaved oil consumption by 10 percent, savings would exceed 400 MBD.

Are such savings really achievable on a voluntary basis? In one sense we do not know for certain. Americans have tightened their energy belts considerably over the past eight years in response to rising energy costs. This means that a certain amount of the "fat" has already been taken out of our energy habits. Further reductions in energy use may involve more sacrifice. However, it must be stressed that DR measures are intended to be used only in emergency situations when supplies have been disrupted. In view of that fact as well as the intention to remove the restrictions as soon as the crisis is over, large savings may still be achievable.

Many measures are easier to prepare on a voluntary basis than on a mandatory one. If a measure appears to have value, its

use on a voluntary basis may be warranted even though the savings would not be as great as if it were mandatory. Some restraints, such as a compressed work week, may save a significant amount of fuel on a voluntary basis but would not be feasible as mandatory measures at the Federal level because the administrative aspects of applying and enforcing them would be overwhelming.

In addition, if the public is made aware of the tradeoffs involved between voluntary and mandatory measures (i.e., more versus less flexibility, no penalties, etc.) they may cooperate and save considerable fuel. The Los Angeles experience, described earlier, is an example of a program that was so successful in its voluntary phase that its mandatory phase, which included stiffer reductions and enforcement of penalties, was never invoked.

Public awareness is essential to success

Public awareness is necessary in all aspects of demand restraint planning. During past emergencies, misconceptions about the nature of the problem led many people to mistrust Government attempts at a solution.

Public information programs are the vehicle by which voluntary programs are implemented. Even mandatory programs depend on public information for their success. The Federal Government must communicate to the people not only what actions can be taken to deal with the disruption, but also how to proceed and what results can be expected. The role that the citizens play will be determined by the credibility of the information programs that the Government develops. In order to elicit cooperation, information must be consistent and readily understandable. Especially in the case of voluntary programs, information should emphasize that everyone can do something to save fuel. A variety of choices can be presented.

In the earliest stages of an emergency the public must be reassured that supplies will be available to meet essential needs. The Government can explain why each individual's cooperation with demand restraint programs is essential and how these and other contingency programs can help assure adequate supplies and minimal price increases. Public information programs should be well planned in advance so they can spring into action to discourage initial hoarding of supplies that could create temporary but real shortages at the consumer level.

To be effective, public information programs need to be designed carefully and well in advance of disruptions. Specific details will have to be included at the last minute, but the basic format and materials should be already worked out. So, too, should the distribution channels at the Federal, State, and local level.

A MENU OF MEASURES IS NEEDED

What is required is a framework of authority and responsibility for Federal and State emergency response action. Into this

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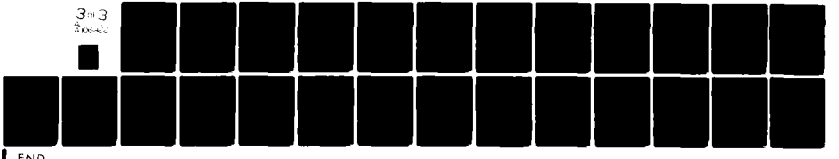

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would fit a menu of measures, designed to be as varied as possible in order to be useful in a wide range of crises. Measures should be included that could be implemented incrementally from minor to severe. The Federal Government needs to establish predictable plans so that States can tailor their own responses accordingly. Well-defined programs are required with responses appropriate for various levels of shortfall. This would help to soften some of the opposition that past demand restraint proposals have met because there was uncertainty about how they would be used. Formulated in conjunction with State and local governments, comprehensive Federal plans should be the basis for a flexible approach to emergency demand restraint. Such plans could be developed in phases so that some level of response would be available for use immediately, if necessary, while the more time-consuming approaches are being developed.

PHASED APPROACH TO STANDBY PLANNING

A phased approach to demand restraint planning and program pre-implementation would allow programs to become available for emergency use as soon as they are completed. For instance, the first stage would be to design and put in place the least disruptive programs, often those that save the least fuel, but that have few negative side effects and provide the symbolic value of "sharing the burden" among all of the people. Public information programs should be designed that stress voluntary actions to which the public could readily adapt. These might include encouraging ridesharing, trip planning and use of public transit as well as vehicle maintenance such as correct tire pressure and proper engine tune-up. In addition, an initial response could incorporate a few mandatory measures, along with the emphasis on voluntary response, in order to assure the public that the crisis is a real one and that everyone's particiption is essential. These might include minimum purchase, odd/even, strict enforcement of 55 mph and building temperature restrictions. These restraints have been used in the past and people are familiar with them. They are mandatory but have the advantages of being able to be quickly imposed and of unifying the nation's response to crisis. They are imposed equally and require few exemptions so they tend to give a feeling of equitable treatment. The possibility of some unexpected negative result from these measures is fairly slight since they have been widely used before.

In order to prepare this part of the emergency package, DOE would need to provide specific guidelines. Authority for implementing the measures must be clear and responsibility well defined. The plan would need to specify how each mandatory measure would be enforced and the resources necessary for implementation would have to be identified, with reasonable assurance that they could be obtained.

Estimated savings from the phase I program would be relatively small. Estimates vary for each measure and no analysis has been done to show their effect when used together. A conservative estimate of the savings these programs might achieve is between 210 and 340 MBD.

Enforcement of minimum purchase and odd/even could be through retail gasoline outlets. Increased enforcement of the speed limit could be financed by an increase in fines for violations. States have gained experience with both measures in the past. If the program were imposed at the Federal level, States would still be responsible for implementation. A definite plan from DOE would provide the States with the basis for planning the required enforcement, as well as their own supplemental programs.

States are primarily interested in providing for the continuation of services and prevention of chaos. A firm plan of action from the Federal Government would facilitate further State planning because States would know what to expect. States know they will need "coping" measures and so they are concentrating on the preservation of vital services during an emergency. The measures proposed in phase I are familiar to the States and all have a strong mitigating component. The reliable savings are small but these measures are available now for incorporation into Federal standby plans.

Phase II planning would include measures with more potential for savings, but which currently are less well defined and may have negative aspects that must be addressed. Examples discussed earlier in this chapter include reduced gasoline and diesel fuel purchases, reduced jet fuel use, and cutbacks by leading industrial users of energy. This level of planning would examine the potential each has for significant savings, and seek to develop both voluntary and mandatory standby programs as quickly as possible. Phase II planning would assess the feasibility of mandatory approaches and how they should be applied, if necessary.

Consultation with industry would play a big part in developing the phase II plans. Most of the measures that have been considered by DOE concern saving transportation fuel. Industry is knowledgeable about their own demand patterns and can probably suggest ways to cut back during an emergency. Industries gained experience in past shortages and have probably been considering how to deal with similar problems in the future. This is a valuable resource that the Government has not tapped.

In order to establish phase II measures as standby Federal actions, either voluntary or mandatory, considerably more analysis needs to be done. At present, there is too little State-specific data available to accurately calculate effects on individual States. A dialogue will need to be established between DOE and the States in order to develop plans that will be both effective and equitable. It must be understood that severe measures would only be used in the event of a serious shortfall and that Federal imposition would end when the crisis was over or when the State established the necessary restraint.

A wide variety of options is available for each of these measures so it is not possible to predict the savings with any accuracy without defining a particular approach. Conservative estimates of what might be saved using phase II measures are as follows:

ESTIMATED PHASE II SAVINGS (MBD)

REDUCED GASOLINE/DIESEL FUEL PURCHASES (10%)	500
REDUCED JET FUEL USE (10%)	100
ENERGY CUTBACKS BY KEY INDUSTRIES (5%)	200
SPEED LIMIT REDUCTIONS	200-300
REDUCTIONS IN ELECTRICITY, GAS AND OIL USE BY RESIDENCES, COMMERCIAL AND INDUSTRIAL FIRMS	160 oil/315 gas

These savings would depend on reliable public information programs and adequate backup data. They also would be affected by price increases. The effectiveness of demand restraint measures is greatly enhanced by price decontrol. These estimates are based on an assumption of uncontrolled price increases. They assume somewhat less than 100 percent compliance.

The third phase of planning would assess harsher measures which have considerable savings potential but involve substantial changes in lifestyles and/or inequities. These measures may be needed as back up for dealing with severe, lengthy disruptions. Examples, also discussed earlier, are restrictions on vehicle use, closed gas stations on weekends, and a compressed work week. Although this is not the first priority, steps should be taken to ready these measures for standby availability, in case the need arises.

A fourth and final phase of planning would explore potentially useful ideas which have not been analyzed. As technology advances into new areas, ideas become feasible that were previously speculative. Such options as increasing the gasoline supply by adding 10 percent alcohol appear to hold promise in the future. These phase IV measures are not presently well-defined, but they could be explored once a sound contingency plan using more conventional measures is ready.

Using a phased approach to planning would enable rapid development of a standby program. A well-planned demand restraint component is needed in any Federal contingency plan. The value of contingency programs lies in their ability to offset the damaging effects of a supply shortfall. In this regard, demand restraint measures appear to have been useful in the past and could be expected to provide significant benefits in the future. Although actual fuel savings of some measures may be small, the difficulties of implementing them are also minimal. In addition, they may help to prevent hoarding and other detrimental side effects of an emergency.

Besides, in addition to increased oil supplies via surge oil production, drawdown of oil stocks, and fuel substitution, there are few remaining possibilities: demand restraint; allocation; and higher prices. Of these, the first seems clearly preferable. While allocation programs could resolve any imbalance in distribution, they do not help to bridge the gap between supply and demand. They also involve considerable inequities and inefficiencies. Increased prices help to bring demand into line with reduced

supplies, but the hardships caused by very high prices are apparent. Prices are bound to go up in a disruption, but demand restraint measures can help to take off some of the upward pressure. If people are willing to tighten their energy belts for the temporary period of a disruption without great personal sacrifice, why not give them the opportunity? If a reasonable amount is saved, energy prices will not go as high as they otherwise would.

Even given all of the other possibilities, our contingency plans may not be adequate to deal with a severe disruption. With strong public information programs and strong public cooperation, the effect of voluntary measures may offset a significant part of a shortfall. Add to that the potential of a range of mandatory measures and the need to include demand restraints in comprehensive contingency plans cannot be ignored.

CHAPTER XII

ALLOCATION OPTIONS

Probably the most contentious issue concerning appropriate reactions to oil market disruptions is how--or whether--the government should distribute the curtailed supply. This chapter attempts to clarify the issue by analyzing the two basic approaches to distribution. These approaches are to rely entirely on unregulated markets to distribute the remaining oil supply or to allocate oil and control its price on the basis of governmentally set priorities. Arguments for and against each approach are presented, as are modifications of each designed to answer some of the more serious drawbacks. The discussion cites a range of options for oil distribution and tries to narrow that range by showing how well each answers the need for an effective emergency distribution system. 1/

THE UNREGULATED MARKET APPROACH

Along with the general emphasis on deregulation in the transportation and energy industries during the past few years has come an interest in using unregulated markets to distribute supplies during disruptions. The market approach relies on the belief that society will be better off if oil distribution during disruptions is left to buyers and sellers, not bureaucrats.

Probably the most common argument for this approach is that markets are efficient; that is, they send supplies where they are in greatest demand. By interfering with demand and supply, and especially if prices are controlled, allocation systems cause oil to be consumed in activities where the oil is not highly valued. Some people or businesses who would buy a larger amount of oil than is available at the controlled price are not permitted to do so. Therefore, that oil is used by others who would not have bought it at a higher price. Unregulated markets, then, permit oil to be used in its higher-valued (more productive) uses. Total economic product is higher than it would be with obstructed markets. A corollary to this proposition is that when prices are allowed to rise to equate supply and demand, oil will be available to all who are ready to pay the price. There will be no gas lines, no rural/urban imbalances and no reason for abuses such as tied sales. Advocates of the market approach also cite its simplicity. It requires no bureaucracy, no regulations, no extraordinary government or industry expense.

Another advantage of unregulated markets is that if the Government makes it clear that it will not bail companies out, prudent managers will take steps to protect themselves by building

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1/In a recently released study, the Congressional Budget Office discusses several distribution mechanisms. See: Congressional Budget Office, Managing Oil Disruptions: Issues and Policy Options, September, 1981.

up stocks. A free market approach also removes the companies' fear that the stocks they hold will be allocated away during a disruption.

Critics of unregulated markets have an impressive list of drawbacks to market distribution. The critics note that skyrocketing prices for petroleum products will price many consumers out of the market, disrupting their lives and even causing some to go without heat. They further point out that among the beneficiaries of this hardship will be the oil companies who will reap large windfall profits because of the increasing prices. Some commentators also question whether unregulated markets supply those people and regions most in need. For example, they question whether oil sold under contract can be diverted from low priority customers to those with socially important functions; whether State and local governments would be able to buy needed products given their tight budgets; or whether majors might cut off independent marketers. Critics also make the political argument that a nonintervention policy would lead to irresistible pressure for allocation and that a hastily passed program would work much less well than one carefully designed beforehand.

THE GOVERNMENTAL ALLOCATION APPROACH

Probably the most important argument for allocation and price control is the perception that it will ensure equity. Admittedly, equity is complex and not amenable to easy definition. For crude oil, the thought is that some refiners, through no fault of their own, will be impacted severly while others may continue to receive their customary supplies. Here, equity seems to call for those whose supplies are not disrupted to share with crude-short refiners. Product allocation is meant to ensure that all of each refiner's (or other seller's) customers continue to receive a proportional amount of available supplies after priority needs are met. The equity achieved here is that no individual or class of wholesalers or retailers are discriminated against by refiners. Rationing is the extreme of this type of allocation because the process is extended all the way to end users, not just to sellers.

Another argument in favor of allocation is that an active government program reassures companies and customers that their interests are being protected. This is important to allay fears which could further disrupt markets as companies scramble for spot supplies and customers rush to gas pumps. A more cynical variant of this view is that the existence of governmental allocation deflects anger from the oil companies to the government, thereby minimizing public outcry against the industry. Needless to say, whether one regards this as good or bad depends on their view of the oil industry.

Of course, allocation has gone hand in hand with domestic oil price control in the past. In combination, they both assure supplies to socially important functions such as health, safety and agriculture, and keep prices as low as possible. This both assures access for customers by charging the lowest feasible price and prevents windfall profits to producers, refiners and retailers.

While the purposes of allocation and price control are laudable, critics make a pursuasive case that they cannot achieve some of these purposes and that others are not reasonable goals.

First, critics point out that price control has drawbacks. By keeping prices down, excess demand is maintained. With curtailed supply, the result is lines at gas pumps. Low prices work against the goal of demand restraint which is an important part of our domestic and international contingency planning.

Second, they point to the many practical difficulties of past allocation programs. As noted in Chapter VI, allocation programs have been subject to a host of administrative problems. They are complex and burden the industry. Priorities are difficult to draw up and subject to political influence and abuse. Finally, the actual allocations must rest on some past pattern of consumption. Since the pattern of demand will probably be quite different during a disruption, distributing gasoline or other products to where they were used before will mean gluts in some areas and acute shortages in others. This problem was widely noted during the 1979 Iranian shortfall. The tying of current allocations to the past will penalize consumers or sellers with rapidly growing needs while giving a windfall to those with shrinking needs.

Finally, opponents of governmental allocation and price control point out that such a system creates a constituency for its perpetuation. At worst, this constituency may be able to preserve the system long after a disruption has passed. This was the case after the 1973-74 embargo when price controls contributed to higher demand and imports until 1981 when they were removed.

PRACTICAL OPTIONS FOR EMERGENCY OIL DISTRIBUTION

Clearly, the "pure" options of totally unregulated markets and full allocation and price control have serious drawbacks. Probably the most sensitive points concerning unregulated markets are the hardships caused by very high prices and the large windfall profits generated by those prices. On allocation's side, the inequities and abuses of poor administration, setting priorities, and the lack of response to changing demand patterns are often cited along with the excess demand caused by price control. Proposals have been made to use either the market or allocation with provisions designed to counter the drawbacks. Essentially, these proposals are for modified free market approaches which deal with the hardship and windfall profits issues and simplified allocations which do not--or nearly do not--control prices.

Tax/rebate plans

Those who would use unregulated markets feel that their efficiency can be combined with a plan to distribute money which

will alleviate hardships. This can be done by rebating the large increases in Windfall Profits and corporate income taxes to be received by the Treasury. The Federal Government would take more than half the additional revenue without additional taxes or surcharges. If further revenue was needed, or there was a desire to capture more of the windfall profits, surcharges or import fees could be imposed. Rebates could take various forms: per household, per capita, or specially designed to provide funds for essential health and safety services. While any number of tax/rebate plans can be defined, we briefly outline two alternatives here as illustrations.

General tax/rebate

Under this alternative, prices for gasoline and other petroleum products, as well as for domestic crude, would be allowed to rise to market clearing levels. This increase would result in a very large transfer of income from consumers to the oil industry. Part of this added income would be recovered by the Government through the existing Windfall Profits Tax. In fact, the combination of this tax with corporate, State and Federal income taxes would divert two-thirds or more of all increased profits on domestic crude oil to the Federal and State governments. Additional funds could be recovered by measures such as an emergency surcharge to the Windfall Profits Tax or an emergency ad valorem tax on the margins of refiners and distributors to capture the inventory profits associated with the disruption.

This added government income would be rebated to the general public. Several mechanisms could be used. Money could be sent directly to individuals by mailing checks or by electronic funds transfers to bank accounts. The Federal and possibly the State tax systems could be used by adjusting withholding rates. Existing transfer programs such as aid to families with dependent children, supplemental security income, food stamps, low-income energy assistance and social security could be increased.

Any such rebate distribution system, however, would be complex. Specifically, the problem is that equity can only be bought with increasing complexity and cost. A recent report commissioned by DOE goes into this problem is some detail. 1/

The simplest alternative posed by the report's authors is to reduce Federal income taxes and make relatively untied block grants to the States so that special cases could be served at each State's discretion. Such a system would be relatively simple to institute--taking somewhere up to 90 days to set up and about 1 to 2 months to get going. Expense would also be low, probably less than $2 million in direct Federal expenditures and up to 10 percent of the total block grants for administrative expense. The equity

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1/ ICF Incorporated, Mechanisms for Recycling Federal Tax Revenues to Individuals and Households in the Event of a Sudden Increase in the Price of Oil (Washington, D.C.: ICF, April 1981).

problems of such a simple system would be severe. Those who paid less tax than the reduction would benefit only partially. Those who paid no Federal income taxes would receive no benefit. United State block grants could be used to fill these gaps, but success would depend on the effectiveness of the State programs.

At the other extreme of complexity, the report analyzes a system which would combine per capita energy payments through the income tax system, per capita payments through the Social Security and Supplemental Security Income programs, and a block grant system with strict guidelines to ensure that the grants serve those not covered by either of the first two distribution mechanisms. Such a system would be highly equitable, with all Americans receiving a share of rebated taxes. The costs, however, would be high. The report's authors estimated that such a system would take at least 6 months to set up and 3 to 4 months to get running. Costs would be high--more than $400 million per year to the Federal Government, up to 10 percent of the block grants, and a significant but unknown cost to private employers.

Not controlling prices under this or any similar tax/rebate proposals poses an inflationary danger. If the price of gasoline and other products were allowed to reach market clearing levels, these increases would be registered on the cost-of-living index (CPI) and would have repercussions throughout the economy. The CPI registers only the selling price of gasoline. Neither the value of a ration coupon, nor the rebate is included in the formula. The cost of gasoline would, therefore, appear higher under the tax/rebate plan than under rationing, leading to inflationary pressures in wages and benefits tied to the CPI. This difficulty, of course, could be overcome by recalculating the CPI.

The general tax/rebate would have the advantages of encouraging conservation of all petroleum products and fostering the highest value uses of existing supplies. It would avoid the costs and inefficiencies of price control. On the other hand, the distribution of rebates would present political as well as administrative problems. Very large sums would be involved, uncontrolled prices would be unpopular and would probably be perceived as unfair. The distribution of rebates would have to be very carefully tailored to compensate for the large transfer of income.

A further problem might be posed by the attitude of the American people towards the plan during an emergency. If the rebate were allocated in the same way as ration coupons, that is, by registered motor vehicle, then the distribution of income would be the same as under gasoline rationing. However, the distribution of money would make the implicit distribution of income more evident to the public. Distributing coupons to motor vehicle owners may be perceived as fair whereas the equivalent distribution of money may not be.

Of course, other rebate plans are possible. Another suggestion has been to rebate the proceeds to all households. Such a rebate would be considerably more progressive than a rebate to vehicle owners because the poor own fewer cars and spend less on gasoline.

Value added tax alternative

An alternative tax/rebate program would be a "value added tax" (VAT) on crude oil producers and petroleum refiners and distributors. The amount of the VAT at each stage in the petroleum industry could be determined either on the basis of historical margins or by comparison with world prices. The latter method would probably be simpler. Thus, if immediately prior to the disruption, the price of both domestic and foreign crude were $35 a barrel and during the shortfall world prices rose to $50, a VAT of $15 could be imposed on refiners and other processors. Furthermore, if disruptions were imposed to limit the consumption of imported crude and products, their amounts could be added to the appropriate VAT.

This alternative deals with raising revenues. Funds could be distributed according to any rebate formula. Like the windfall profits proposal, VAT would avoid the inefficiencies and costs of the reimposition of price and other controls and would insure that the burden of conservation during a shortfall would not fall exclusively on gasoline users. It has some distinct advantages over the windfall profits and similar taxes. It could take effect almost immediately and could be phased out easily. It is a flexible instrument in that it could be targetted to achieve specific energy policy goals, such as encouraging domestic crude production or specific refinery operations like the production of heating oil instead of gasoline. Because this form of taxation is susceptible to more precise targetting, the American people might find it more acceptable. While it would be associated with high prices, it could be shown to be directly associated with foreign price increases as in the examaple cited above. Furthermore, it could visibly contribute to energy policy ends.

Allocating only crude oil

One alternative to full-fledged oil allocation and price control is to allocate crude only. This has several advantages. First, it is much simpler, involving refineries rather than thousands of wholesalers and retailers. Second, it goes a long way to ensure regional equity since refiners in each region would be receiving roughly proportional supplies. Third, except for the crude which is shared among refiners, there need not be price controls which work against restraining demand.

DOE has a standby program which embodies many of these advantages. The program--Option III of the Standby Crude Oil Allocation Program--would distribute crude to refiners so that all would have enough crude to run at an average utilization rate.

The main problem in any crude sharing scheme is setting the price for the shared crude. Under the current version of Option III, all refiner-buyers would have to pay actual acqusition costs. 1/ The problem with such a rule is that refiner-sellers would have no incentive to seek inexpensive oil, thus putting added upward pressure on spot markets. In 1979 DOE proposed 5 alternative pricing formulas for refiner-sellers. Three of these would have been based on some weighted average of acquisition costs while the remaining two would have approximated actual acquisition cost. Although hearings were held in December 1979, no action to modify the pricing rule was taken.

What is needed is a pricing arrangement which will cause refiner-sellers to try to acquire the lowest-cost oil possible and avoid the spot market. At the same time, prices should not be set so low as to penalize the sellers by permitting buyers to get oil priced far below replacement cost. This can be done in any number of ways; the point is that prices should wind up near acquisition costs. The DOE Option III would lead to prices considerably below replacement cost. The National Petroleum Council in its recent emergency preparedness study suggests a plausible pricing policy. The price charged by refiner-sellers would consist of a weighted average of the most costly one-third of their crude. This would be a high price but usually somewhat below the spot market price. Thus, prices for most crude would not be controlled and shared crude would be at prices quite near market levels.

Using public and private stocks

Some observers have pointed out that private oil stocks are currently high and that the SPR will soon contain enough oil so that drawdown becomes a real possiblility. The general discussion of using SPR and private stocks can be found in Chapters III and IX of this volume. However, one way stocks can be used is as an adjunct to--or even as a substitute for--an allocation program.

SPR oil could be substituted for crude allocation by supplying crude-short refiners. Oil could be allocated from the SPR to these refiners in several ways. It could be sold directly to any refiner who has lost more than a stipulated percentage of supplies; it could be auctioned to those who were disrupted; or it could be sold on the open market.

Private stocks could be used in a similar way, with the Government intervening to promote stock drawdown. The advantages of such a program would be to prevent hoarding and increase supplies reaching the market, helping to keep prices down and generally using oil in the national rather than private interest. The disadvantages would also be great. Such a program would be a

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1/During shortfalls of less than 7 percent, small refiners would pay average costs.

big disincentive to build stocks. Companies would argue that they would not get the full benefits of their stockpiled oil if they were forced to use or sell it when, or at a price, they felt was not in their interest. The technical problems of defining just what stocks could be used without damaging company operations are severe since company needs for working stocks vary widely. DOE does not currently have the capability to manage stocks on a company-by-company basis, and calling for and the same drawdown industry-wide could be disasterous to some operators. There is also the argument that the companies would, by looking out for their own security be protecting the national interest better than the Federal Government could.

Implementing oil supply assurance programs

Two basic points should be kept in mind when designing and implementing oil distribution programs. First, such programs will deeply affect the Nation during disruptions so they must be fully developed beforehand and kept ready for timely implementation. Second, a variety of measures should be available to respond to different sizes and types of disruptions which can be applied at different times as they are needed.

Both modified free market policies such as tax rebates and modified allocation schemes such as crude only and use of public and private stocks hold promise. However, they are all currently at the conceptual stage and much detailed analysis needs to be done before specific versions of some or all of them can be chosen.

Chapter XIII

WAYS TO IMPROVE ENERGY EMERGENCY PREPAREDNESS AT THE INTERNATIONAL LEVEL

The IEA Emergency Sharing System (ESS) was created to deal with oil supply disruptions that result in a supply shortfall of 7 percent or more to one or more member nations or the entire group. The 1979 Iranian oil supply disruption vividly demonstrates that whatever the merits or limits of this system, there is a vital need to have other measures available to deal with smaller oil disruptions. Since 1979, the IEA has developed some new measures designed to address this problem.

Our review indicates that while the ESS theoretically offers considerable potential for dealing with moderate to large oil supply disruptions, there are numerous problems that arise from the way in which it has been implemented. As a result, it is not clear whether the ESS would be implemented in a 7 percent or greater disruption, or if it would work well. These problems need to be addressed so that the United States and other IEA member nations can deal with oil supply disruptions effectively. Our review also indicates that the IEA's efforts to improve its ability to cope with smaller disruptions, while useful, are not sufficient to ensure quick and effective response.

Most other countries, and nearly all of our allies, are even more vulnerable to oil supply disruptions than we are. Should Europe and Japan be cut off from a substantial amount of their oil imports, and should they be unable to cope, their prosperity and stability and that of the entire international economic and political order would be in jeopardy. Thus, it makes sense for the United States to promote contingency programs that can reduce our allies' vulnerability as well as our own.

Important actions need to be taken to improve contingency planning and emergency preparedness at the international level. The IEA has been the focal point of U.S. international energy contingency planning; consequently, our discussion centers on measures to be taken within the context of the IEA.

INCREASE SIZE OF EMERGENCY RESERVES AND UPGRADE OTHER ASPECTS OF PROGRAM

The most important element of the IEA Emergency Sharing System is the emergency reserve requirement. Reserves hold the greatest potential to offset the adverse impacts of a disruption. For example, in supply disruptions which reduced IEA oil supply by 10 percent, 20 percent, and 33 percent, emergency reserves could offset the impact by 30 percent, 50 percent, and 70 percent, respectively. In each case, the remainder would be offset by demand restraint. Emergency reserves have an advantage over demand restraint in that they can directly substitute for lost oil and largely eliminate the economic impacts and personal

hardships associated with lost supplies. In contrast, demand restraint incurs economic losses and personal sacrifice.

The IEA emergency reserve requirement is 90 days of net oil imports. However, the IEA's operational definition of emergency reserves counts working oil stocks that could not actually be used in an emergency. Exactly what portion of total stocks are needed for working level purposes is hard to say. One reason for this information gap is that the IEA has not conducted reviews of the effectiveness of the measures taken by each member country to meet its emergency reserve commitment--even though the IEP agreement requires it to do so. According to some estimates of requirements for working oil stocks, in early 1980 up to three-fifths of the U.S. and Japanese emergency reserve requirements and nearly one-third of the IEA European nation reserve requirements would not have been available in an emergency if they were to be satisfied by oil stocks. By early 1981 the situation had improved considerably. Even so, if the United States and Japan relied on oil stocks to fully satisfy their emergency reserve commitment, their actual oil stocks available for emergency use might be short of the commitment by more than one-third.

Our analysis indicates that even if all IEA countries had 90 days of true emergency reserves, these would not be sufficient to deal with an oil supply disruption of 12 MMBD lasting a year. Our analysis of actual stocks which were held by the United States, Japan and IEA Europe in early 1981 and which possibly could have been used for emergency purposes indicates these would have lasted only 5 months in a disruption of 12 MMBD, and barely more than a year in a 7 MMBD disruption. Yet according to the previous Secretary of Energy, the United States and IEA countries must be prepared to deal with disruptions of this magnitude and for at least a year's duration. Also, contingency planning must anticipate the possibility of multiple disruptions of various sizes occurring over time. Any substantial drawdown of stocks could take a long time to replenish--leaving a major gap in emergency preparedness during the interim.

The IEA approach to emergency reserves is apparently based on the assumption that severe disruptions lasting a year or more will not occur or need not be prepared for. While no one can predict with certainty whether and what disruptions will occur in the future, these assumptions are open to question. Considering the consequences that would result if they were disproven, we question their prudence.

The principal reason why IEA nations are reluctant to build larger emergency reserves is the cost. But when one considers the economic, political and security costs that would result from oil disruptions if the nations are not prepared, and when one considers the resources spent each year by IEA countries on military defense, the costs of building larger emergency reserves do not appear unreasonable. Furthermore, there is the added advantage that eventually much of the cost of holding larger emergency reserves may be be recouped, even if disruptions requiring their use never occur.

When IEA nations are no longer significantly dependent upon foreign oil, as a result of a transition to greater use of other types of energy, they will be able to sell their reserves. Since oil is likely to increase in value over future years, oil bought today for emergency stock purposes may be sold tomorrow for a profit.

We believe that the United States should seek redefining of the IEA emergency reserve requirement to require 90 days of true emergency reserves and consider expanding that requirement to 120 days. 1/ A requirement of 120 days of emergency reserves would substantially increase IEA nations' capabilities for coping with disruptions. Even so, if oil stocks were used to satisfy the emergency reserve drawdown obligation in a worst case disruption (i.e., 12 MMBD), oil stocks would be fully exhausted in about 10 months and drawndown to the halfway point in about 5 months. Building such reserves would, of course, have to be done gradually and under stable market conditions. Larger reserves would help deter international disruptions and significantly increase the capability of IEA nations to weather severe oil supply disruptions when they occur.

Moreover, there is an added advantage during the period of stock building. The oil being bought to build stocks can serve as an added cushion to offset a disruption. For example, if IEA nations are increasing stocks at the rate of 1 MMBD when a disruption of 4 MMBD occurs, one-fourth of that disruption can be offset simply by ceasing stock building. This would be accomplished without drawing down any of the emergency stocks already set aside.

Along with a commitment to increasing their emergency reserves, the IEA nations should commit themselves to clearly identifying what oil stocks can be used in an emergency and whether the member country governments have the necessary authority and mechanisms to control the use of these reserves in an emergency. Concerning the latter point, in most IEA countries oil stocks are privately owned and not under the control of the government. As noted elsewhere in this report, the U.S. Government has not required oil companies to hold emergency reserves to meet our IEA commitment. Until September 1981, the U.S. Government will have the authority to exercise control over company stocks in an emergency, but the Government presently is without the means to do so effectively.

1/In December 1979, the IEA Governing Board ordered a re-evaluation of the adequacy of the 90-day emergency reserve level. In May 1980, the Board concluded that the 90 day requirement appears to provide reasonable protection against future emergencies. Our analysis, however, indicates that the requirement would not be sufficient to deal with major disruptions that lasted a year or more, and that it would be compromised by multiple disruptions of lesser size over time. The IEA is once again re-examining, partly as a result of U.S. Government prompting, the adequacy of the 90-day requirement.

Thus, we believe that the United States should urge the IEA, as the IEP Agreement stipulates, to review the effectiveness of measures taken by each participating country to meet its emergency reserve commitment and recommend improvements as appropriate.

PROVIDE FOR FLEXIBLE USE OF A PORTION OF EMERGENCY RESERVES

The 1979 Iranian oil supply disruption clearly demonstrated the need for measures to deal with shortfalls below the ESS trigger level. A program is needed to limit demand for spot market oil to reduce the likelihood of skyrocketing spot prices, which may be translated into increases in official sales prices for OPEC oil. In early 1979 world oil stocks were low. In the crisis atmosphere which accompanied the Iranian shortfall, aggressive stockbuilding contributed significantly to upward pressure on spot prices. One and one-half years later, in the fall of 1980, another potential crisis loomed with the onset of the Iran-Iraq war, which also disrupted world oil markets. This time, however, world oil stocks were high. During the next six months frantic buying to build stocks did not occur and panic buying on the spot market was largely avoided.

This experience is another argument in favor of increasing emergency reserves. And it is an argument in favor of setting aside a portion of emergency reserves to use to counter world oil market instability, including disruptions that are too small to trigger the ESS.

Since the 1979 interruption the IEA has developed a system for consultation involving the IEA Secretariat, the oil industry, and IEA member country governments concerning stock policies. This system was activated in the fall of 1980 and used by IEA countries to persuade oil companies to limit spot market demand and to coordinate stock drawdown. The system may have moderated the actions of oil companies, reassuring them in the confusion caused by the Iran-Iraq war. Observers differ about this. Some contend that the principal factor keeping markets stable was the companies' favorable stock position and not the influence of the IEA or IEA governments.

The IEA consultation system is a step in the right direction, but is a weak instrument for taking effective action. It depends on securing consensus among 21 member countries, at the time of an impending crisis, to specific policy actions. If a consensus can be secured, it then depends largely on member governments persuading the oil industry operating in their respective countries to cooperate.

The IEA countries need a stronger mechanism for dealing with this problem. At a minimum, the countries should increase the size of their emergency reserves and set aside a portion of those reserves to use in the event of market instability or disruptions that are not large enough to trigger the ESS. During disruptions, the member countries could meet and agree to permit a drawdown

of part, or all if judged necessary, of these flexible emergency reserves to reduce pressures on the spot market and balance supply and demand. 1/ This kind of action, of course, would require that member country governments have control over their emergency reserves.

AN OIL MARKET STABILIZATION MECHANISM

We believe there is a strong case for creating a more effective mechanism for using flexible reserves. One possibility would be the creation of an international spot market stabilization fund, patterned on the mechanism used by major industrialized countries to protect national currencies against unwarranted speculative price changes in international money markets. While the mechanics of international exchange rate intervention procedures differ from country to country, all systems function along similar lines. Basically, a secret fund is maintained by the central government for use in buying and selling domestic currency on international markets. The intent of such transactions is not to artificially prop up the value of any given currency on a long-term basis, but rather to smooth over temporary speculative price changes. The size and activity of the fund are secret in order to avoid signaling to speculators either the extent of the resources a government has available to support its currency or the timing and extent of actual intervention efforts. In this manner market participants are never actually aware of whether the government is or is not "in the market", nor what currency prices would be if the government were not a market participant. Market participants are aware, however, that the government stands ready to intervene if it feels price movements are excessive. This awareness tends to discourage holding large speculative positions and encourages the valuation of currencies in a manner consistent with long term supply and demand conditions.

Intervention funds also function similarly in crisis situations. Little attempt is made to prevent price movements justified by fundamentally changed market conditions but only to encourage orderly change consistent with the actual alteration in underlying market circumstances. Should any individual fund be insufficient

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1/Since December 1979, the IEA has studied the idea of member countries holding additional stocks, above the 90 day emergency reserve requirement, for flexible use. The IEA has also had under study several other proposals for moderating spot market activity. Among these are: (1) requiring registration of oil trading entities operating in the IEA countries (to secure better information on spot prices during periods of market instability and to keep out newcomers interested in driving up prices for speculative purposes); (2) a code of conduct, designed to discourage or forbid anti-competitive market practices; and (3) cool-off procedures, such as precluding stock building for speculative purposes. These measures have not attracted a great deal of support among member countries. They would probably be more difficult to implement or provide less assurance of being effective.

to avoid rapid price changes, intervention authorities have "swap" lines to temporarily augment the size of intervention funds by borrowing directly from the intervention funds of other countries with whom prior arrangements have been concluded, and in certain circumstances from the International Monetary Fund. These borrowings are outside the market, and do not affect currency values until actually used for intervention. Swap arrangements have proven highly effective in stemming short-run speculative price gyrations.

Modeling an intervention system on the basis of an exchange stabilization fund would entail the following:

1. The creation of an oil reserve pool available to each government which could be sold in spot markets should the need arise. This need not be a mechanism such as the SPR, which would have to be stored in tanks or underground, pumped and shipped, but could be government ownership of oil cargos on commercial ships at sea. This would enable the government to sell actual "wet" supply in world markets.

2. The creation of a monetary intervention pool, to enable each government to purchase oil in the spot market for the oil reserve pool, or to buy and sell "paper" cargos in a future market for later delivery.

3. International agreements on joint intervention programs or oil "swap" lines between IEA nations. Within this framework, all would agree to maintain floating oil reserve pools and either intervene jointly, or swap floating storage at pre-set transfer prices, to enable an intervening country to maintain adequate supplies.

Although there are other ways that attempt to reduce spot oil price fluctuations, a market intervention fund would have several attractive features. Prominent among them would be secrecy, simplicity, and size.

Once the floating reserve is established at a particular level, just what ships constitute it, and whether it is actually being used to intervene in spot markets could easily be kept secret. Since oil cargos are often interchangeable, and change hands several times before the final purchaser takes possession at a refinery, the government would be able to shuffle the cargos it owns more or less continuously. All that matters is that a certain percentage of cargos at sea is owned by the government. For similar reasons, government sales and purchases in the spot market could be readily disguised.

The size of any reserve need not be very large. The spot market is by its very nature a marginal one. Once established, the system would be simple to operate. All intervenors need do is act as oil traders, following price movements in the market by telex and telephone, selling through several "blinds" when

prices rise above acceptable daily limits, and buying if prices fall too precipitously.

In summary, spot market activity can have an impact on world oil contract prices far in excess of its normal economic significance. The U.S. and other industrialized consumers were unsuccessful in mitigating the scramble for spot supplies in 1979, despite unilateral and multilateral efforts. Based on past performance, it is unlikely the agreement recently concluded among all IEA member nations to refrain from making "abnormal" purchases of oil on the spot market during a future crisis will be highly effective. Consequently, consideration of an intervention mechanism for use in the crude oil spot market similar to that employed by governments to influence international currency markets might be appropriate at the present time. U.S. participation in such a system would, of course, require authorizing legislation.

IMPROVE INFORMATION ON OIL STOCKS

As discussed in Chapter VII of this volume, successful oil stock policy measures depend on knowledge about what is happening with oil stocks at sea and oil stocks in the secondary distribution and consumer sectors. The IEA recognized this in the aftermath of the 1979 Iranian oil supply interruption when it ordered the improvement of its Oil Market Information System to incorporate data from member countries on oil stocks at sea and secondary stocks.

However, the latter decision has since been reversed, and while the former has been implemented, some IEA countries and oil companies are urging its discontinuance. Continued collection of data on oil stocks at sea is an important ingredient to sound contingency planning and emergency preparedness.

IMPROVE DEMAND RESTRAINT PROGRAMS

During the 1979 oil supply interruption, which was not big enough to trigger the ESS, IEA countries agreed to lower demand by 5 percent of anticipated consumption. This objective was not met, which raises a serious question about the adequacy of member country programs.

The IEP Agreement of 1974 stipulated that the IEA would continually review each participating country's demand restraint program. However, the reviews it has conducted have been infrequent and limited by available manpower and resources, and cannot be considered in-depth reviews of demand restraint adequacy or effectiveness.

We believe the IEA countries need to re-examine their commitment to the demand restraint component of the ESS and decide whether they really want it. The United States has a particularly poor record on this score and owes it to both itself and its fellow members to make a realistic appraisal. If a disruption occurred in the near future, the Government would have to rely on

allocation programs or dramatic price increases to achieve the demand restraint obligations we would have if the Emergency Sharing System were activated.

If IEA country programs do not work as intended, then the Emergency Sharing System will be in jeopardy when a disruption triggers it. Member country oil stocks and emergency reserves will probably be drawn down quicker than they otherwise would be. This, in turn, may affect the willingness of some member countries to honor obligations to share oil with other members. And the length of time during which the system can effectively operate will be diminished.

If member countries are not serious about demand restraint or unable to implement it as designed, then alternative measures are needed to fill the gap demand restraint is intended to fill. If member countries really believe in demand restraint, both the members and the IEA Secretariat should demonstrate that sound programs have been or will be established. The IEA should conduct more thorough and frequent reviews of each member country's programs.

If and when sound demand restraint programs do exist, the IEA countries should be prepared to make use of them in disruptions too low to trigger the ESS. Of course, demand restraint programs do have significant economic costs and impose personal sacrifices. This explains some of the reluctance of member countries to resort to them. This, it should be noted, is another reason to expand emergency reserves and set aside a portion for use during smaller disruptions. Drawing down oil stocks does not impose the economic costs and personal sacrifices that accompany demand restraint.

Nonetheless, substantial costs are involved in buying and storing stocks. Once drawn down stocks cannot play a contingency role until they are built up again. Emergency stocks set aside for flexible use would also not last for a long time. Thus, there is a genuine need for demand restraint measures.

UPGRADE THE ALLOCATION SYSTEM

The IEA has spent more time and resources on the ESS allocation mechanism than the other major components. This is by far the most difficult component to implement, since it requires interaction of 21 member country governments, numerous oil companies, and the IEA Secretariat. It involves nothing less than imposing an international governmental emergency system for operating a substantial portion of the complex international oil market.

While much progress has been made in developing the allocation system, questions still exist on whether the system can function adequately in emergencies. The system has never had a real test. Three simulated tests have been conducted, but these have not evaluated all the major components.

The allocation mechanism has several serious problems. First, it depends critically on accurate and timely oil supply information. Yet the system has suffered from poor data quality, inadequate coverage, and inaccurate forecasting. More importantly, simulated tests of the system have shown that large discrepancies occur. A Department of Energy report has concluded that the system will never function properly unless revised.

Without accurate information, the calculation of allocation rights and obligations will be distorted, impeding oil allocation to member countries and impairing confidence in the ability of the system to function. It must be recognized that in any serious disruption temptations will be strong for oil companies to divert oil to storage, to underestimate their future supply position, and to be tardy in acknowledging a favorable supply position. Given the stakes involved in a serious disruption, suspicions will be easily kindled. Consequently, it is imperative that the information system be capable of resolving discrepancies about the flow of oil into and among IEA countries. Otherwise, countries with allocation obligations may be tempted to not honor them, and countries may be tempted to cheat the system. The net result could be breakdown and abandonment of the system.

A second problem is that there is no binding mechanism for resolving price disputes among IEA countries over allocated oil. At a minimum, a mechanism for resolving price disputes, if only on a temporary basis until a disruption is over, needs to be established.

A third problem concerns each member nation's mechanism for "fair sharing" or allocation of available oil supplies within its own boundaries. The IEA system depends critically on oil companies, operating in countries that have allocation obligations, voluntarily offering to make some of their oil supplies available to IEA countries having allocation rights. To operate most effectively, it is necessary that these offers in aggregate approximate the allocation rights. If they do not, the IEA Secretariat will have to notify governments of the countries to deliver the required amounts of oil to countries with unsatisfied rights.

Two matters are of concern here. First, oil companies operating in the United States, for example, are unlikely to offer to divert some of their oil to other nations unless they are confident that they will have access to a fair share of the remaining oil available in the United States. If the U.S. Government does not have a fair sharing program, the companies are not likely to make many voluntary offers. Second, if the situation arises where the U.S. Government must order one or more companies to divert oil, how will it decide which companies and in what amounts if a fair sharing program does not exist? This question is especially relevant because it is not clear that the U.S. standby emergency domestic allocation programs for the IEP, which help assure fair sharing, will exist beyond September 30, 1981, the expiration date of EPAA. GAO is presently reviewing the use of section 251 of EPCA as authority for these programs.

Both the IEA Secretariat and the oil industry are uncertain about whether fair sharing programs will operate effectively in a number of IEA countries. The IEA has not assessed the operational effectiveness of member countries' allocation programs. We believe such reviews need to be made.

ESTABLISH AN EMERGENCY OIL TAX OR OIL SUPPLY DISRUPTION TARIFF

Increased emergency reserves, emergency oil stocks for flexible use, and effective demand restraint measures can all operate to alleviate upward pressure on oil prices during supply disruptions, particularly small disruptions which do not trigger the ESS. However, it must be recognized that any substantial oil disruption will result in sizeable increases in, first, spot market prices and, subsequently, official OPEC sales prices. Large transfers of wealth to the producing countries will occur, and significant economic damage to the oil importing nations will result. Perhaps the worst aspect of these price increases is that once oil markets return to normal, prices do not revert to their previous level. Thus, the negative economic consequences are longterm and not confined to the disruption period.

The IEA countries need a mechanism for at least reducing the negative price and economic consequences which are bound to occur in a major oil disruption. Both the 1973-74 oil embargo and the 1979 Iranian oil disruption were, compared to other possible disruptions, relatively small in both size and duration. Yet, in the first case oil prices tripled and in the second they doubled.

One way to deal with this problem would be for the IEA nations to agree to use either an emergency disruption tax on oil products or a crude oil disruption tariff in the event of serious disruptions. If employed before soaring spot prices had peaked or been translated into higher OPEC official sales prices, it could reduce the transfer of wealth abroad. The United States and other oil importing nations would pay less for their oil imports. At the same time, a tax or tariff could be used in the early stages of a disruption to curtail demand.

There are several potential problems associated with this instrument. First, it would not be easy to identify what size tax would be required to balance supply and demand. Care would have to be taken not to overestimate the tax. Otherwise, consumers would reduce demand more than necessary, and the negative impacts on output and unemployment would be greater than necessary. Second, setting a tax at a time of shortage and when prices are already rising rapidly could be politically very unpopular. Strong public information programs would be needed to explain the benefits of the tax. The tax could also be made more palatable by employing a system to rapidly rebate the tax revenues to consumers and/or use government grants to local governments for distribution to those least able to afford higher fuel prices.

Third, some producer nations might react unfavorably to the use of such taxes, viewing them as a mechanism for taking away revenues which should accrue to them as the value of their resource increases. They could retaliate by cutting back production to permit a further increase in the price they charge for their oil. Such production cutbacks and increased producer prices would of course further exaggerate the adverse impacts of a disruption. Producer retaliation would be especially likely if the disruption itself was in the form of a politically motivated embargo. To deal with this possibility, the IEA countries would exercise their political judgment at the time of a disruption as to whether to activate the previously established mechanisms. If employed, the IEA would make it perfectly clear that any tax would be temporary, used only during the disruption. Procedures would be incorporated in the mechanism providing for periodic review of continuing use of the measure.

Finally, achieving agreement among 21 member countries as to what would be a "fair" tax for all would be extremely difficult, since the price of oil and oil product taxation vary widely across IEA countries. The effect of an added emergency tax will vary, depending in part on the role of oil as an energy source in each country.

Nontheless, taxes for use in severe disruptions deserve consideration. Given the wide divergence in energy prices and taxes among member countries, a reasonable basis for agreement might be a tax that increases each country's prices in about the same proportion. At the same time, it might be desirable to make some adjustments in favor of those countries in which oil accounts for a greater proportion of their total energy mix and consumption. There will be no formula that can be demonstrated to be perfectly fair to all countries and in all situations. For this reason, and because it will take time to reach an agreement, it is important to negotiate a formula now. Once a disruption occurs, there may not be enough time to secure agreement and act.

APPENDIX

United States Senate

COMMITTEE ON
GOVERNMENTAL AFFAIRS
SENATE PERMANENT SUBCOMMITTEE
ON INVESTIGATIONS
WASHINGTON, D.C. 20510

The Honorable Elmer B. Staats
Comptroller General
General Accounting Office
Washington, D. C.

Dear Mr. Staats:

I would like to thank you for your excellent testimony yesterday. I appreciate the work you and your staff have done to highlight the past and present problems of the gasoline allocation program.

Throughout the hearing, I heard testimony from you and others about the incapacity of that program to prevent or alleviate gas lines if the nation ever faces another serious supply emergency. I can only conclude that it would not be of much help. This leads me to wonder whether any other DOE emergency programs would be of any greater use if they ever had to be implemented -- and, in short, whether DOE is doing what it could do and should do to prepare for a severe supply disruption.

Therefore, as Ranking Minority Member of the Senate Permanent Subcommittee on Investigations, I would like to have the GAO look into how prepared the United States is for coping with a major oil supply disruption, and what steps can be taken to improve this situation. Given the importance of this matter, I urge you to give top priority to this effort and designate some of your best staff to work on it. I hope you can complete it as soon as possible, preferably by the end of the 1980 calendar year. My staff will be pleased to work with yours to ensure that the final product can be as useful as possible. If your staff has any questions about this matter, please have them contact Bill Strauss, Special Energy Counsel to the Minority, at 224-3586.

Again my thanks for your fine testimony and the GAO's continuing interest in this important area.

Sincerely,

Charles H. Percy
United States Senator

CHP:ars

Congress of the United States

JOINT ECONOMIC COMMITTEE

(CREATED PURSUANT TO SEC. 5(a) OF PUBLIC LAW 304, 79TH CONGRESS)

WASHINGTON, D.C. 20510

July 15, 1980

The Honorable Elmer B. Staats
Comptroller General
General Accounting Office
441 G Street
Washington, D.C. 20548

Dear Comptroller General;

The Department of Energy recently noted that a major worldwide oil shortfall of 20 million barrels per day could cost the United States $685 billion in one year. Considering the present worldwide conditions, we must be prepared for a shortfall.

For several years, the General Accounting Office has criticized the Department of Energy's ability to deal with a major oil supply disruption. Most recently, in a report on the gasoline allocation system, GAO concluded that the 1979 gasoline shortage "underscored our lack of preparedness to minimize the impact of such disruptions."

In response to a recent Congressional inquiry, Secretary of Energy Duncan replied that the Department is "making progress in the area of energy preparedness...." Secretary Duncan noted further that, "I am in the process of consolidating DOE's contingency planning in a single office reporting to the Administrator, Economic Regulatory Administration. The Office of Energy Contingency Planning will be the focal point for development of DOE's response plans and for their integration with the plans of other affected sectors -- international, federal, state, local, and industrial."

The Energy Subcommittee of the Joint Economic Committee has had a continuing interest in the management of energy crisis. In recent years, it has become clear that our nation's energy posture is an integral part of our overall national security. Therefore, our contingency plans for a disruption of our foreign oil supply are a matter of overriding national concern. Despite official pronouncements to the contrary, I am concerned that the United States may be in no better position to deal with a foreign oil supply interruption than we were before the 1973 Arab oil embargo.

I would appreciate it if you would provide the Subcommittee with a report investigating and evaluating the Department of Energy's present capabilities in contingency management. In particular, I would like included in the report an evaluation of the Office of Energy Contingency.

I understand that the General Accounting Office has issued many reports on specific aspects of contingency management. I would hope that this previous work could serve as the basis for a comprehensive analysis of the Department of Energy's current contingency plans.

Sincerely,

Edward M. Kennedy
Chairman
Energy Subcommittee